Dyslexia in the UAE: Developing a framework for Screening and Support

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Abstract

This doctoral research has two primary objectives: to develop culturally-appropriate assessment methods for diagnosing Emirati students with dyslexia; and to examine a possible framework for intervention and support techniques that addresses the needs of Emirati students with dyslexia.

Three major studies were carried out:

Study 1: Translation and adaptation of the Dyslexia Adult Screening Test for the Arabic language (A-DAST). This involved translation of all eleven DAST tests from English to Arabic, adapting them where appropriate to the different cultural and linguistic environment. The A-DAST was then normed for Arabic Higher Education students through administration to a set of 280 students in the Higher Colleges of Technology (HCT), and appropriate norms derived and compared with DAST norms for UK populations. Results of the study revealed two factors through factor analysis: i) the literacy-related cognitive deficit and ii) non-linguistic mental speed. Comparison between the two cohorts on measures of literacy attainment revealed similar performance in both cohorts of these subtests. However, Emirati students showed poor performance in nonsense passage reading which is attributed to the irregular nature of Arabic orthography.

Study 2: Assessment of counselling and support needs of Emirati dyslexics. A 75-item questionnaire was administered to the 280 HCT students. The questionnaire was divided into five sections which focused on counselling services in general, counselling staff, students' academic problems, and students' psychological, emotional, and social problems. Results showed that the students considered the counselling and support

services in HCT were inadequate and lacked specialised programmes to address the academic, social and emotional needs of Emirati dyslexics.

Study 3: Intervention and support programme for Emirati dyslexic students. Those students identified as dyslexic were invited to participate in a specially-developed intervention and support programme during which their academic progress was assessed prior to and after the intervention. The intervention and support programme focused on three elements: 1) Literacy training, 2) Enhancing learning strategies and building self-awareness, and 3) improving memory. Analysis of repeated measures of students' self-assessment and teachers' assessments yielded highly significant results. A substantial effect over time was observed from students' and teachers' responses. In addition, significant improvement was observed in students' grades in Maths and English, and in their performance on dyslexia indicator sub-tests.

Overall results demonstrate that the assessment method and the intervention and support programme helped Emirati dyslexic students to improve their academic performance in addition to their performance on dyslexia measures. Directions for further research are discussed.

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Chapter 1

General Introduction

1. 1 Introduction

Dyslexia is a subject that continues to be debatable. It has become an international concern and intrigued attention from educators, psychologists, neuropsychologists, linguists and counsellors over the last century. This attention has resulted in debates about the extent, nature and manifestation of dyslexia, diagnosis and assessment tools, causes and intervention and support mechanisms. A widely accepted traditional definition of developmental dyslexia is "*a disorder in children who, despite conventional classroom experience, fail to attain the language skills of reading, writing and spelling commensurate with their intellectual abilities*" (World Federation of Neurology, 1968: 26). This definition has attracted criticism due to its narrow focus on emphasis on deficits. However, the diversity of research interest in the field of developmental dyslexia led to an improved understanding of the nature of dyslexia and alternative terminologies such as "specific learning disability" have emerged (Pumfrey & Rosen, 1991).

Culturally-appropriate assessment methods are essential in the effort to accurately diagnose and support dyslexic individuals. Accurate diagnosis and intervention leads to a more effective outcome in remediation, especially in reading and writing skills. A lack of culturally-appropriate assessment methods, accurate diagnosis and support can often lead dyslexic individuals to suffer losses in self-esteem, confidence, and motivation.

In spite of the fact that developmental dyslexia is recognized worldwide as one type of learning disability, the advancement in diagnostic methods and understanding of its nature and manifestations remains limited to a few languages. Most of the research

concerning developmental dyslexia and the difficulties associated with acquiring literacy has been carried out by American, British, Canadian and Australian scholars, with the majority of the participants being monolingual English-speaking individuals. Hence, much of what we know about the nature, the origins and the causes of developmental dyslexia comes from the English language only.

The emergence of cross-linguistic studies on developmental dyslexia drew attention from the researchers around the world to the significance of understanding the nature of dyslexia in different languages and the need for culture-specific dyslexia assessments to enable appropriate and accurate diagnosis across languages and cultures. For instance, research findings suggest that understanding the relevant linguistic features of the language in question is the key to identifying the signs of dyslexia and understanding its nature in that particular language (Goswami, 2000; Goulandris, 2003; Smythe & Everatt, 2004; Zeigler & Goswami, 2005). Studies by Brezntiz (2003), Miller, Guron & Lundberg (2004), and Veii and Everatt (2005) highlight the magnitude and the impact of orthography on literacy. Snowling (2000, p. 206) reports that different writing systems pose diverse challenges to the readers and learners of those languages, due to the 'regularity or transparency of their orthographies', which refers to the clarity of the relationship between the symbols and sounds (phoneme-grapheme relationship). For instance, Italian and Greek are considered transparent orthographies as they possess a simple relationship between the written symbols and the language sounds. Therefore the reader and the learner of those languages is faced with fewer challenges compared to those of the English language, simply due to the fact that English is less transparent in its orthography and script (Wimmer, 1993). However, Arabic is unique in its transparency depending on the type and level of literature. Comprehensive accounts of the characteristics of Arabic orthography will be presented in a later section.

1.2 A Summary of the Research Study on Dyslexia in the UAE: Developing a framework for Screening and Support

This research study was instigated with the purpose of developing an appropriate support and intervention programme for Emirati Arabic speaking college students with learning difficulties. Therefore, the present research is an assessment for support rather than an assessment of dyslexia. The development of such support and intervention methods requires a process to identify students who will particularly benefit from these types of support and which understands their needs. Hence, a culturally-appropriate assessment tool for dyslexia was deemed essential to meet the purpose of this present study.

The following three studies were designed to achieve the intended objectives of the study: a) translation and adaptation of the Dyslexia Adult Screening Test for the Arabic language (A-DAST), b) assessment of counselling and support needs of Emirati dyslexics, and c) an intervention and support programme for Emirati dyslexic students.

1.3 Organization of the Study

The thesis is divided into nine chapters. The first chapter provides an overview of the whole thesis and outlines its benefits.

The second chapter reviews various historical definitions of developmental dyslexia, issues related to the lack of a consensus with regard to the definition for developmental dyslexia, and researchers' views around the use of intelligence quotient in the definition and assessment of developmental dyslexia. This chapter adopted a multi-level approach from Frith (1997) to examine the various theories of developmental

dyslexia, giving account to behaviour, brain and cognitive based theories. It also provides a brief account to counselling needs of dyslexic individuals.

The third chapter provides an insight into the nature of the Arabic language, exploring its orthography and writing system; it outlines the challenges rooted in the specific nature of the Arabic language including its phonology and morphology, highlights the linguistic and writing similarities between Arabic and English, and describes progress on developmental dyslexia in Arabic speaking countries in terms of empirical studies, assessment, policy and practice. Finally, the issues around dyslexia and English as second (additional) language are examined, giving consideration to the effect of the specific linguistic features of the native language on the acquisition of the second language and the role of the language transparency in that.

The fourth chapter explores the framework of assessment of Specific Learning Difficulties (SpLD) practised in higher education in the UK.

The fifth chapter outlines the methodology and the rationale for the empirical study in addition to the research questions, research hypotheses, the setting of the study, methods used including data collection and analysis, and ethical and practical considerations.

The sixth chapter provides a detailed explanation of the first main study which aims to identify norms of dyslexia amongst Emirati students in Higher Education, including the administration of two preliminary studies to achieve further modification of the Arabic Dyslexia Adult Screening Test (A-DAST).

The seventh chapter provides a detailed account of the second study which aims at assessing counselling and support needs of Emirati dyslexics.

The eighth chapter presents the third and the final study, which is an intervention and support programme for Emirati dyslexics.

The ninth chapter is the concluding phase of this thesis. It provides a general discussion of the results and findings, limitations of the study and recommendations for further research.

Chapter 2

Dyslexia in the WEST

2.1 Introduction

Over the years dyslexia has been defined in different ways and in some cases with different labels. Some definitions share similarities and others are different. Therefore, the literature presented in this chapter is an attempt to offer a historical overview of progress in the field of dyslexia, its theories and methods of diagnosis. This historical approach has been utilized as it a) highlights the origin of dyslexia research and explains the various terms used to define dyslexia and its characteristics, and b) illustrates the progress of scientific research over the years, which has not been hindered by the lack of consensus amongst researchers about the definition of dyslexia. Researchers from diverse professional backgrounds and interests continue to strive to provide causal explanations, diagnostic tools and remediation frameworks for the condition.

Most importantly, the main reason for a historical approach throughout this chapter is that this thesis is intended to be used as a guide for novice researchers and those who are interested in the field of dyslexia in the Arab world in general and the UAE in particular. It has been highlighted throughout this PhD thesis that all the empirical studies relating to dyslexia focus on the English language and publications are available mostly in English. The research studies, resources and publications addressing dyslexia in other languages such as the Arabic language are very limited and, unfortunately, this limited body of research is mostly available in the English language only, making access of information limited to the bilingual Arabic population alone. Therefore, it is deemed

essential to adopt this approach and provide a full account of the historical progression of research development on developmental dyslexia to the Arab world. To ensure access of information to a wider population, this PhD thesis will be translated into Arabic. A copy of this thesis will be made available in both Arabic and English language at the public libraries across the UAE and the Culture and Science Association in Dubai.

The logical starting point is to provide a definition of the term dyslexia and methods of diagnosis, and subsequently to discuss theories of developmental dyslexia, highlighting their strengths and limitations using a causal modelling framework (Morton & Frith, 1995).

2.2 Dyslexia origin

The origin of the word ‘dyslexia’ is Greek. It is derived from ‘Dys-’, meaning poor, inadequate or having difficulty with, and ‘-lexia’, meaning words or languages (Doyle, 1999). Therefore, the word dyslexia is a description of reading difficulty of a specific nature. The complexity of the reading process and the nature of the condition which affects various skills such as auditory and visual, information processing (brain), and both receptive and expressive language, has attracted attention of many researchers from various disciplines to study dyslexia.

Dyslexia was originally identified by medical professionals describing the clinical characteristics of the condition in terms of a deficit in language ability caused by stroke, accident or trauma. Aphasia was the terminology used to refer to this condition. Research studies undertaken as part of this PhD thesis are merely concerned with developmental dyslexia which affects an individual’s attainment and literacy abilities. Other forms of dyslexia which could be due to evident neurological deficit caused by traumas, stroke or accidents are not within the scope of this investigation. In the following section a historical account is given of the progress of developmental dyslexia since the nineteenth century, for the reasons specified earlier in the introduction.

2.3 Dyslexia definition: A Historical Overview

Defining dyslexia is a complicated task due to a lack of consensus amongst researchers when trying to describe this phenomenon. Nonetheless, developmental dyslexia is traditionally defined as a specific learning disability usually detected when there is a discrepancy of at least eighteen months between an individual’s reading and chronological

age, despite receiving adequate tuition and with no apparent cause of emotional difficulties or low intelligence. Dyslexia is considered the most common learning disability, affecting approximately 5-10% of school age children around the world (Caravolas, 2005). Manifestations include persistent spelling errors, difficulties in reading accuracy, letter reversals, confusing left and right, difficulty recognizing familiar words, difficulties in sequencing (of both words and ideas) and difficulty in simple copying. A range of difficulties can be associated with dyslexia, distinctly more extensive than this overview; however, comprehensive lists are available in Miles (1983) and Fawcett and Nicolson (1994). These detailed manifestations are neither highlighted in the general definition nor in the definition used for diagnostic purposes. Although there is a general agreement amongst the researchers around the manifestation of dyslexia across different languages, there is still a lack of consensus around the causes of dyslexia in different orthographies (Caravolas, 2005; Goswami, 2002).

Following claims in the nineteenth century which stated that linguistic ability is localized in a particular section of the left hemisphere of the human brain (Kussmaul, 1878 & Miles, 1961), research findings published by Broca (1861) and Wernicke (1874) focused on language deficits associated with injuries to different parts of the brain. Dyslexia remained broadly defined in terms of a clinical framework by medical professionals until the 1960s, when the ground-breaking discovery of 'congenital word blindness' was debated and interest amongst researchers shifted to examining the differences between dyslexics and normal readers. "Lorenz, Tinbergen and Frisch argued that specific disabilities and abilities exist in humans" (Von Euler 2002:18)

The World Federation of Neurology (1968) defined dyslexia as: *"A disorder in children who, despite conventional classroom experience, fail to attain the language skills of reading, writing and spelling commensurate with their intellectual abilities*" (Miles & Miles 1999: 169).

The same team has identified the condition as 'Specific developmental dyslexia' and produced the following definition: "*A disorder manifested by difficulty in learning to read despite conventional instruction, adequate intelligence, and socio-cultural opportunity. It depends on fundamental cognitive disabilities which are frequently of constitutional origin." (Turner 1997:3).*

As is clear in both definitions, learning difficulty is regarded by the Federation of Neurology as a disorder when a child continues to experience difficulties in reading in the presence of adequate ability and tuition.

Snowling (2000) criticized the definitions presented by the Federation and argued that terminologies such as 'conventional instruction' and 'socio-cultural opportunity' are ill-defined. Additionally, 'definition by exclusion' was regarded a further drawback by Snowling (2000). 'Adequate intelligence' drew its share of dissatisfaction which will be visited at a later stage in this chapter. "Frequently constitutional origin" was disputed by Ellis (1993), as the defining criteria in practice were psychological and social.

Over the last century several definitions of dyslexia have appeared, largely referring to reading, writing and spelling as significant areas of weakness. However, there are other definitions which merely focus on reading. For instance, Critchley (1964, p 116) defines dyslexia as: '*a difficulty in learning to read, which is constitutional, often genetically*

determined and which is unassociated with general intellectual retardation, primary emotional stability, or gross physical defects.'

In 1978 Wheeler and Watkins introduced over a dozen 'discrepancy' definitions which primarily referred to written language skills, for example the differences between an individual's potential (intelligence test score) and performance in reading, writing and spelling tasks. This is highlighted in the definition provided by Thomson and Watkins (1990, p 3):

'Developmental dyslexia is a severe difficulty with the written form of language independent of intelligence, cultural and emotional causation. It is characterized by the individuals' reading, writing and spelling attainments being well below the level expected, based on intelligence and chronological age. The difficulty is a cognitive one affecting those language skills associated with the written form, particularly visual, verbal, short-term memory, order perception and sequencing.'

The British Dyslexia Association (1989) defines dyslexia as: *"A specific difficulty in learning, constitutional in origin, in one or more reading, spelling and writing language which may be accompanied by difficulty in number work. It is particularly related to mastering and using written language (alphabetic, numerical and musical notation) although often affecting oral language to some degree"*.

In the above definition presented by the BDA, dyslexia is not perceived as a disorder and excludes ability and adequate tuition. However; there is consensus with the World Federation of Neurology in terms of dyslexia association with difficulties in reading and related areas, primarily writing and spelling.

The definition of dyslexia below, produced by the World Health Organization in 1993, introduces for the first time specific objective measures; however, disagreements exist in terms of the cut-off point to be applied as the definition merely depends on a discrepancy in reading IQ. This notion has been criticized and will be discussed at a later stage in this chapter.

"A score on reading accuracy and/or comprehension that is at least 2 standard errors of prediction below the level expected on the basis of the child's chronological age and general intelligence, with both reading skills and IQ assessed in an individually administered test standardized for the child's culture and educational system"

Two symptom–based definitions were introduced in 1994 by the International Dyslexia Association Research Committee, known as the Samuel Orton Society. These definitions outline symptoms observed amongst dyslexic individuals without identifying a causal relationship. Both definitions list outcomes related to academia that can be observed in a classroom setting. This is clear in the following two examples,

"A Neurologically based, often familial, disorder that interferes with the acquisition and processing of language. Varying in degrees of severity, it is manifested by difficulties in receptive and expressive language, including phonological processing, in reading, writing, spelling, handwriting, and sometime arithmetic. Dyslexia is not a result of lack of motivation, sensory impairment, inadequate instructional or environmental opportunities, or rather limiting conditions, but may occur together with these conditions". (Pumfrey 2001:144)

"Dyslexia is one of several distinct learning disabilities. It is a specific language-based disorder of constitutional origin characterized by difficulties in word decoding, usually

reflecting insufficient phonological processing abilities. These difficulties in single word decoding are often unexpected in relation to age and other cognitive and academic abilities; they are not the result of generalized developmental disability or sensory impairment. Dyslexia is manifested by variable difficulty with different forms of language, often including, in addition to problem reading, a conspicuous problem with acquiring proficiency in writing and spelling".

In 1997 The British Dyslexia Association presented the definition below, which is symptom-based and provides some reference to the cause but does not account for the exclusionary criteria. It highlights the effects of dyslexia on skills other than language and literacy to include motor functions, musical skills, numeracy and organizational skills.

"*A complex neurological condition, which is constitutional in origin. The symptoms may affect many areas of learning and function, and may be described as a specific difficulty in reading, spelling and written language. One or more of these areas may be affected. Numeracy, notational skills (music), motor function and organizational skills may be involved. However, it is particularly related to mastering written language, although oral language may be affected to some degree". (Reid 1998:2)*

The difficulty with the discrepancy definition is twofold: i) a lack of differentiation exists between dyslexics and other poor readers (Stanovich, 1991; Siegel, 1992); ii) the exclusion of older dyslexics or those who have been able to compensate by other means and no longer experience major problems with literacy; those with emotional problems, sensory deficit or neurological problems; those who are socioeconomically disadvantaged; and those who have a reading difficulty and below average level of intellect.

For those accepting the discrepancy definition of dyslexia, a child with limited intellectual ability, prolonged absences from school, or those who are too emotionally disturbed to learn as a result of dyslexia or otherwise, are automatically ruled out following the exclusionary definition (Fawcett & Nicolson, 1994). This could result in these individuals being deprived of receiving support and therefore possibly suffering academically and psychologically before receiving any help.

There is another category of individuals who are never recognized as having dyslexia: those who achieve due to commitment and hard work. They may never receive help even if they do not reach their full potential, even though they too may also never fail. Subsequently, it is perhaps somewhat surprising to see the notion of a discrepancy definition surviving as long as it has (Mile and Miles, 1990). As is clear in the literature, there have been several objections to it in terms of specifying an adequate effect on functioning and adequate opportunities to access help. The obvious question is, have these concerns been taken seriously? To the best of my knowledge those dyslexics who achieve due to hard work still go un-noticed. In 1988 Siegel was the first to question the usefulness of IQ in diagnosing dyslexia; she highlighted the limitations of the discrepancy definition and offered the "radical solution" of encouraging the abandonment of the IQ test from the assessment of children with learning difficulties (Siegel, 1989).

In her view, the use of IQ tests needs to be challenged in terms of four assumptions: i) IQ tests measure intelligence; ii) intelligence and achievement are independent; iii) IQ scores predict reading and arithmetic scores; and iv) reading disabled individuals of different IQ levels have different cognitive profiles.

According to Siegel (1989) the discrepancy definition utilizes an IQ measure such as the Wechsler Intelligence Scale of Children (WISC) to predict the ability to read. Wechsler (1976) includes sub-tests to measure a set of cognitive functions by means of word knowledge, expressive language, motor skills and social situations; these subtests are irrelevant in terms of examining the skills which identify reading disability (Siegel, 1989). IQ is related to socio-economic status which consequently leads those of lower socio-economic status to achieve lower scores on IQ measures (Siegel & Himel's, 1998). Siegel (1989) regards the process of score calculation to be: '*an illogical way of calculating whether or not there is a learning disability'* (1989:477). Siegel also highlights the assumption that those poor readers who have average or high IQ constitute a different group from poor readers with low IQ (i.e. 'garden variety' poor readers). Findings from studies by Ellis et al. (1996) and Share (1996) support Siegel's notion of "garden variety". Siegel (1989) concludes that: '*based on a detailed knowledge of the child's academic skills makes more sense that some extrapolation of what reading (or spelling or arithmetic) should be, based on some imprecise IQ measure and an illogical discrepancy definition.'* (1989:477)

Similarly, Stanovich (1991) argues that '*Researchers and practitioners in the field do not seem to have realized that it [the concept of IQ] is a foundation concept for the very idea of dyslexia... Without a clear conception of the construct of intelligence, the notion of reading disability, as currently defined, dissolves into incoherence.'* (1991:130). He highlights the absence of evidence on dyslexic children differing from poor readers without a reading IQ discrepancy in terms of heritability, performance and neuro-anatomy. Stanovish (1991) suggests keeping the notion of discrepancy but investigating the discrepancy between reading ability and listening comprehension rather than reading ability and IQ, as stated by the

discrepancy definition. Aaron (1994) supported the views presented by Siegel (1989), arguing that the relationship between IQ and reading achievement is unidirectional, and the degree of the correlation is high. Substantial evidence exists to support the notion that poor readers read less than good readers and consequently receive poor IQ scores due to deficits in language and vocabulary skills (Aaron, 1994).

Reid & Kirk (2001) highlighted that the nature of the IQ test presents challenges for individuals with dyslexia, and hence the aggregate score of its subtests may not reveal the real intellectual ability of an individual. Frith (1997) disagrees with the use of IQ in defining developmental dyslexia, arguing that it introduces bias against dyslexics with less ability as in order to find a discrepancy scores on IQ should be fairly high.

Attitudes towards IQ remain divided as to whether the concept itself has any secure scientific basis (Kamin, 1977; Howe 1988). It is imperative to clarify that arguments in opposition to intelligence testing do not intend to establish that the entire theory of intelligence testing is at fault, but rather the summing up and providing a composite figure of IQ is defeatist (Miles and Miles, 1990). As individuals at any given time have particular strengths and weaknesses, it may be useful to use subtest items from traditional intelligence tests to identify these skills (Miles and Miles 1990). Additionally, a wide range of skills can be taught through different teaching and learning methods (Skinner, 1953; Platt, 1973). These methods may address specific needs of individuals and therefore identify an individual's 'potential' but a figure such as IQ sets limits to what that individual is capable of achieving; this is an unnecessary barrier (Miles and Miles, 1990).

Another complication is that the notion of intelligence testing raises debate over political and social matters (Kamin, 1977). Specifically, if these figures are fixed then this leads those individuals with low scores to be disadvantaged in life, as this might imply that these individuals cannot be helped or supported in any way.

Traditional definitions of dyslexia mainly focused on exclusionary factors such as sensory, intelligence, socio-economic status, and neurological, emotional and instructional factors. As a result children with emotional problems, brain damage, and low mental abilities were excluded. Children who did not have adequate educational instruction were also excluded. It was then customary for hearing and visual acuity to be assessed. This exclusionary definition of developmental dyslexia is counterproductive as it does not highlight the difficulties associated with writing and reading (Vellutino, 1979; Miles 1994) However, due to the impact of the one of the core cognitive theories, phonological deficit hypothesis, on dyslexia research, the definition offered by the Orton Society highlights the phonological difficulties associated with dyslexics:

'*Dyslexia is a neurologically-based, often familial disorder which interferes with the acquisition and processing of language. Varying in the degrees of severity, it is manifested by difficulties in receptive and expressive language, including phonological processing in reading, writing, spelling and handwriting and sometimes arithmetic.' (Orton Society, 1995)*

Many scholars in the field point out that a more appropriate approach to defining and understanding dyslexia is to focus on the underlying cognitive processes and the description of the characteristics of dyslexic people. The most common view has been that dyslexia is

associated with deficiencies in short-term memory tasks. This view has attracted a vast amount of research to examine such associations and provide appropriate explanations. For example, Miles (1982), Vellution (1987), and Chasty (1985) describe dyslexia as a syndrome with various symptoms such as complications in achieving developmental milestones, difficulties with short-term memory tasks, left and right confusion, and familial factors. These features were addressed by means of the Bangor Dyslexia Test (Miles, 1982). After extensive research and experiments with dyslexic and non-dyslexic children, Miles (1983a, p.98) stated: "*Dyslexia should not be thought of simply as a difficulty with reading or as difficulty with spelling but that the reading and spelling problems of a dyslexic person are part of a wider disability which shows itself whenever symbolic material has to be identified and named".*

Clinical background suggests that definitions of dyslexia that incorporate deficits in information-processing abilities are the most useful (Miles and Miles, 1990). During diagnostic assessments, counselling, and training of dyslexic adults, poor short-term memory has been identified as the most common weakness; this has also been evident in difficulties with work-related tasks and performance on psychometric tests (Moody et al, 1997). The administration of both Wechsler Adult Intelligence Scale-Revised (WAIS-R; Wechsler, 1981) and Wechsler Intelligence Scale for Children-Revised (WISC-R; Wechsler, 1976) tests have yielded consistent results indicating that dyslexic children and adults have a common weakness in short-term memory (Bartlett and Moody, 2000). Hence, these findings suggest that definitions, diagnoses and intervention programmes for supporting dyslexics should focus on enhancing short-term memory, and that difficulties with literacy skills should be seen as only a single symptom of the presentation.

The existence of numerous types of dyslexia definitions supports the notion that dyslexia signifies a broad range of deficits associated with literacy attainment, individual difference and positive personal attribute will always be present, "and that any difficulties are only a part of the big picture" (Reid, 2002). Reid & Kirk (2001) state a fundamental resulting issue, that not all individuals with dyslexia exhibit the same characteristics and to the same degree. They also highlight that dyslexia definitions tend to reflect a broad conceptual framework while the individuality of learners with dyslexia is acknowledged. Singleton (2002) argues that dyslexia often does not exist alone, but may co-occur along with one or more other conditions such as motor-perceptual dysfunction, language delays or distractibility or hyperactivity, a fact which complicates the problem. Hornsby (1995) argues that dyslexia appears in various forms which can have various different causes such as poor verbal naming, poor spatial awareness, inadequate reading and writing, and poor organizational skills.

Snowling (2000) supports the unitary definition of dyslexia with phonological deficit as the cause as long as it is acknowledged that "*different cognitive subsystems are in constant interaction*" (Snowling 2000:137), while, according to Frith (2002), defining dyslexia at a single level presents a challenge. She presents a three-level approach for definition which is in constant interaction with environmental factors, these levels includes biological, cognitive and behavioural. "*There is evidence for a genetic basis, and it is clear that behavioural signs extend well beyond written language*" (Frith 2002:65). Additionally, according to Frith (2002) dyslexia is a neurological disorder caused by biological deficits resulting in poor speech processing along with a range of clinical manifestations.

Symthe et al. (2004) argue that the confusion in defining dyslexia stems from the fact that historically most of the researchers in the field depended on the classical concept perspective in their work. Smythe et al. (2004) propose the concept of family resemblance of Wittgenstein's theory of concepts as an alternative approach and argue that "*a network of overlapping and criss-crossing similarities may be more appropriate*" (Smythe et al 2004:3). Reid (2002) indicates the importance of staying away from a generic labelling which can lead to misinterpretation and abuse, and ensuring that the dyslexia definition is "*contextualised for the purpose and context to make it meaningful for a specific educational or work context*" (Reid 2002:74).

Thus far, the debate continues and a universal definition for dyslexia remains elusive despite numerous attempts by researchers to arrive at a consensus and an acceptable definition of developmental dyslexia. However, developmental dyslexia continues to be defined in broader terms and characterized by specific difficulties in attainments (reading and writing) in children with normal intelligence and in the absence of neurological or psychiatric conditions which affect children's school achievements (Valdois, 2010). According to Nicolson (2008) the main problem with this historical definition is that a child must fail for two years or so in order for a formal diagnosis to be valid, a situation which may potentially lead to "*a vicious circle of poor reading leading to poor motivation, avoidance of text-based school work, emotional trauma, and adoption of maladaptive strategies such as clowning around, disruptive behaviour, or truancy*" (Nicolson, 2008:1). Therefore, it is imperative that all professional appreciate their own primary task; for instance, the primary task of the researcher is to identify the underlying causes of dyslexia,

while the main task of the educational psychologist is to find the symptoms and that of the practitioner is treatment (Nicolson, 2001).

2.4 Diagnosis of dyslexia

During the early nineteenth century it was recognized that injury to the brain could in some instances lead to the impairment of both speech production and comprehension. These impairments were referred to as 'aphasias'. Gall (cited in Miles and Miles, 1990) has explained aphasia and speech impairments in terms of the 'localization of function', in so far as different parts of the brain can be deemed responsible for different functions. In 1861 the neurologist Broca came up with his famous discovery, which followed a post-mortem examination of a patient's brain, that aphasia was caused by a lesion to the posterior third of the second and third frontal convolutions. This area was later described as Broca's area. However, the notion of locating speech functions in a specific area of the brain was criticized by many in the medical field, who argued it was an oversimplification of the problem.

Kussmaul's (1878) concept of 'word deafness' and 'word blindness' were introduced shortly after the discovery of Broca's area. Kussmaul (1878, p. 775) claimed that '*a complete text-blindness may exist even though the power of sight, the intellect, and the power of speech are intact*'. Kussmaul used the case studies and observations reported by his colleagues to further support his notion of 'word blindness'. The case studies on adult 'word blindness' reported distinct differences in terms of the characteristics and severity of 'word blindness' amongst individuals. For instance, some cases reported a loss or reduction in speech production, poor reading ability and comprehension. Other individuals showed an ability to distinguish the various letters of the alphabet and could even copy the text but were incapable

of translating the words into speech and thought. Some examples of spelling errors include ‘Precy’ for ‘Percy’, ‘seasow’ for ‘seashore’ and ‘scone’ for ‘song’.

Hinshelwood wrote extensively on ‘word blindness’, referring to the concept in terms of visual memory, and reported possible social consequences for children who suffer from such impairment. In 1917 Hinshelwood presented the concepts of heredity and gender, indicating that it was more common in males than females. This notion was further supported by Miles, Haslum & Wheeler, 1998; Richardson & Wydell, 2003; and Singleton, 1999); however, dyslexia has been found to occur at an equal rate amongst both genders in higher education (Stampoltzis & Polychronopoulou, 2008). Hinshelwood was the first to argue that it was a pathological condition, and later in 1917 argued that word blindness is caused by damage in the visual-word-centre in the brain. To illustrate his views, Hinshelwood provided a case report of one of his patients who failed to read what he had transcribed himself.

During the nineteenth century a lot of emphasis was placed on vision, which influenced the use of various visual terms. This did not stop by labelling children as ‘word blind’ but also led to creating a ‘Word Blind Institute’ in Copenhagen and ‘Word Blind Centre’ in London (Miles and Miles, 1990). As is clear from the quote below from Head (1926), it appears that as many other researchers Hinshelwood utilized the same popular theory ‘localization of function’ to understand the nature of reading difficulty in children. Unfortunately, following only one concept limited researchers’ motivation to examine other issues pertinent to the dyslexia known today:

‘*The air was thick with schematic representations of centers of all kinds; here were ‘auditory’, ‘visual’ and ‘motor-word’ centers, centers for writing and naming and even for ‘ideation’.* (Head, 1921, p.49)

Mierzejewsk (1892) followed Hinshelwood and was the first to discover a form of word blindness which he called ‘caecitas syllabaris et verbalis, sed non-litteralis’. His patients showed the ability to recognize individual letters, but failed to unite them into syllables and words.

Samuel Orton (1937) was the next pioneer in the field. He was opposed to the use of the term ‘congenital word blindness’ and suggested that it was misleading as there is neither a true blindness in the ordinary sense of the word, nor blindness for words. Orton also suggested that the term ’congenital word blindness’ only accounts for the inherent factors but not the various environmental factors such as teaching methodology, and social and emotional factors. Consequently he proposed the word ‘developmental’ instead of ‘congenital’ as it encompasses both hereditary and environmental factors.

Orton’s views also differed from Hinshelwood with regards to the causes of the impairment. He reported that the impairment was due to a deficit in physiological development rather than a consequence of damage to a specific ‘centre’ in the brain.

On the other hand, Orton’s views seem to be in congruent with those of Hinshelwood, in terms of the condition being hereditary and more common in males than females, and that affected children can be supported by appropriate teaching methods. As Hinshelwood, Orton also attributed the condition to deficits in visual processing and proposed the term

‘Strephosymbolia’ which means ‘twisting of symbols’, and he believed this to be associated with ‘handedness’ and ‘eyedness’.

Orton suggested that these difficulties can be manifested in various forms. He talked about ‘letter reversals’ or ‘static reversals’ in which confusion occurs between the letters which are the same form but have opposite orientation (e.g. b with d & q with p). The second form he presented was ‘kinetic reversals’ which is clarified by the following example: (e.g. ‘tomorrow’ as ‘tworrom’ and ‘was’ as ‘saw’). He also suggested that these two reversal types are always found to be associated with ‘Strephosymbolia’ and that the frequency and severity of the errors are associated with the degree of reading disability. Orton’s views are still invaluable today, as letter reversals are now acknowledged to be a classic sign for dyslexia and the links between these and unusual ‘eyedness’ have since been further investigated. Orton’s work inspired many researchers and led to the establishment of Orton Dyslexia Society, which is now the International Dyslexia Association. According to the current notion misspellings and letters appearing in the wrong or reverse order do not necessarily suggest a visual component (Miles and Miles 1990).

Monore (1932) undertook a follow-up study of Orton’s Iowa survey and found numerous other errors involving vowels and the omission of sounds. She also investigated the association between mirror-reading and mirror writing with handedness. Despite having only a few case studies which were not backed up with statistical evidence, Monore claimed that children who were left-handed or had left-handed family members showed a higher degree of reversals and repetitions when mirror writing. The views presented by Monore turned out to be controversial; individual differences and personal preferences play a vital role in this sense and as stated by Annett (1985).

MacMeeken's (1942) study revealed that word recognition is a challenging task for children. They could easily name single letters, but even two-letter words such as 'is' and 'on' were in some instances not named correctly, and the blending of individual sounds required a great effort. In addition she has noted the presence of 'reversals' as suggested by Orton. Hermann (1959) as well noted similar findings to MacMeeken and Orton. Hermann's work was very much influenced by Edith Norrie – a dyslexic and the founder of the Word-Blind Institute in Copenhagen (Arkell, 1996). Additionally, Hermann made a further contribution by recognising mistakes while doing gymnastics and dancing, confusion between right and left in everyday life, and frequent confusion about the right place for the silverware when laying a table. After approximately fifty years Hermann's observations are still valid today.

The ground-breaking progression in understanding dyslexia in Britain was in the 1960s with the establishment of the 'Word Blind Centre' in north London. The centre offered both diagnosis and the teaching services for dyslexic children. As the term 'word blindness' became less acceptable, the centre was renamed the 'Word Blind Centre for Dyslexic Children' as a compromise. Further progression and development in the field was recognized in 1970 through the inclusion of dyslexia in the British legal system. The formation of the British Dyslexia Association (BDA) soon followed in 1972.

The findings highlighted in this section, coupled with the recognition of dyslexia in the British legal system, the formation of the BDA, and the use of the labels such as 'Word Blindness', 'Strephosymbolia' and 'Dyslexia' to identify a group of individuals suffering from deficiencies in language and literacy attainment, is in itself an indication of some degree of consensus amongst researchers in the field. Even though the use of labelling has been

disputed in many different areas of science due to misuse of the term, deprivation of certain rights, ridicule and other factors, utilizing labels which carry relevant theoretical connotations has numerous advantages for individuals who belong to these groups; as illustrated by the use of the term 'dyslexia' by Critchley (1981, p. 2):

'*It implies vastly more than a delay in learning to read, which is but the tip of iceberg. The etymology of the term 'dyslexia' expresses admirably a difficulty – not in reading – but in the use of words, how they are identified, what they signify, how they are handled in combination, how they're pronounced, and how they are spelt.'*

The seminal analysis by Vellutino in 1979 brought about a significant change in the focus of dyslexia research. The focus of dyslexia research shifted from visual processing to processing of language which has led to the significant discovery of phonological deficit theory in the 1980s. Considerable research provides evidence to support the phonological deficit hypothesis is terms of difficulties associated with phonological awareness, decoding and processing (Beaton et al., 1997; Bruck, 1993; Fawcett & Nicolson, 1996; Rack et al., 1992; Snowling, 2000; Everatt et al., 2004; Zeigler & Goswami, 2005). To date, the phonological deficit hypothesis remains the dominant explanation of dyslexia and is widely accepted in the dyslexia community.

From the historical overview presented in this section, one can see that developmental dyslexia was derived from "*a medical perspective*" and strongly influenced by "*clinical insight*" (Nicolson, 2008). However, to date there has been significant theoretical progress and practical advancement in the field of developmental dyslexia leading to the emergence of numerous theories and a clearer understanding of manifestations of dyslexia. This

advancement has led to the emergence of many theories, approaches and discrepant findings which made "dyslexia research [a] confusing area" (Nicolson, 2008). Reid & Fawcett (2004) state that an interdisciplinary approach is crucial in understanding the underlying causes of developmental dyslexia. Nicolson (2008) argues the need for the importance of employing "ontogenetic levels" in the explanation of dyslexia, which allows for "causal developmental path" that explains the origin of the symptoms, how they are influenced by genes, brain, history and development. The causal modelling framework (Morton & Frith, 1995) which is described in the next section under 2.6, also provides a platform to fully understand the causes of dyslexia on different levels. Currently the phonological deficit hypothesis is the most dominant causal viewpoint of developmental dyslexia, with a substantial amount of literature providing evidence that deficits in phonological processing and phonological decoding distinguish between dyslexics and non-dyslexics (Everatt & Elbeheri, (2007).

2.5 Diagnosis of Adult Dyslexia

Most of the research available on dyslexia mainly focuses on the difficulties associated with primary school children and adolescents. Recently there has been an interest in researching dyslexia within higher education as significant numbers of dyslexic students have been joining higher education (Gilroy &Miles, 1996; Higher Education Statistics Agency, 1998, 1999, 2000). According to the Higher Education and Adult Training for People with Handicaps the number of dyslexic students entering higher education around the world is steadily increasing (HEATH, 2001); almost 6% of the freshman students enrolled in US higher education have reported some sort of disability in the year 2000, with 4% being

dyslexics. The focus of the research in adult dyslexia is mainly on the issues whether students with learning disabilities belong in higher education, and how can they be accurately diagnosed and supported (Pumfrey, 2008). The overall incidence of dyslexia in 2001 in the UK was reported to be around 2% amongst first-time students in the higher education according to Singleton & Aisbitt, (2001), this percentage was estimated to increase by 41% in 5 years' time. The number of dyslexic students declaring having dyslexia has increased from 8370 in 1999 to 32655 in 2011 [Higher Education Statistics Agency (HESA, 2011).

As highlighted in this review, there are various factors which direct one to believe that a person is dyslexic. A number of definitions of dyslexia focus on the discrepancy between a person's literacy skills and their apparent intelligence. While such definitions fall short of outlining the exact nature of the condition, they do explain a significant feature of dyslexia.

It is more challenging to identify dyslexia in adults than in children. Through experience, adults develop skills and strategies which compensate for their deficits. These compensatory strategies make it more difficult to determine their dyslexic characteristics. Therefore it is crucial that those specialists conducting assessments with adults are fully equipped with the essential knowledge and experience to deal with adult dyslexics, especially in relation to work demands. As many educational psychologists are predominantly experienced with working with children not adults, appropriate higher education issues, workplace knowledge and knowledge of adult dyslexia is paramount here (Reid & Kirk, 2001).

Klein and Sunderland (1998) suggest that a good assessment should include: (i) a clear purpose; (ii) testing the skills necessary for the workplace; (iii) ensuring it is contextual to the vocational area; and (iv) utilizing clear instructions and assessment criteria. A detailed account of dyslexia assessment in higher education is given in the fourth chapter.

Internationally, provision for dyslexic students is gaining the attention of researchers as well as educators, although not at the same level as it is for school age children. In countries such as the UK legislation is in place for universities to allow suitable accommodation to support the educational needs of students with learning disabilities (Singleton & Aisbitt, 2001). However, variability in universities' provision for dyslexic students around the UK was reported, and the findings suggest that the higher education sector as a whole is still far away from providing satisfactory services and support for dyslexic students (Singleton, 1999). Around 20% of UK higher education institutions have changed their policies on assessment and identification following the 1999 report published by Singleton; however, 70% of the institutions made no changes in the process for provision for dyslexic students. Some of the persisting difficulties identified by the researchers were lengthy application process for disability support and allowance, lack of special education tutors in higher education, lack of awareness of the nature of dyslexia amongst the faculty and teaching staff, and the need to embed dyslexia support throughout the higher education institutions rather than central services. Studies by Mortimore and Crozier (2006) confirm lack of higher education institutions' provision for dyslexic students, as the students from seventeen higher education institutions participating in their study reported unmet needs or unwillingness to access support for variety of reasons such as lengthy processes, physical

access, staffing, delays, inadequate communication between student services and academic departments, and support centred around institutions rather than students' needs.

There is variability across higher education institutions in terms of awareness of dyslexia and provision for dyslexic students owing to the lack of strict national guidelines on the assessment and support for dyslexic students. In order to ensure adequate support and accommodation for dyslexic students in higher education it is imperative to have strict legislation and monitored provision.

2.6 Theories of Developmental Dyslexia

2.6.1 Introduction

As highlighted in the first chapter, and earlier in this chapter, dyslexia has attracted researchers from various fields. This has resulted in a significant body of empirical research which in turn has established a structure for a theoretical dispute around the nature of dyslexia, the various theoretical frameworks, and the theories proposed to explain it (British Psychological Association Report: 1999). According to Knight & Hynd (2002) the number of proposed theories to provide causal explanation of dyslexia has increased due to the complex nature of the reading process which involves 'processing of sensory, phonological and semantic information'.

To a great extent the debate pertaining to the diverse causal explanations of developmental dyslexia is related to the reality that these various explanations are derived from diverse levels of analysis. Each avenue explored eventually contributes to advancement

in the field of dyslexia, as similarities in the findings shed a greater perception on a particular theory and discrepancies in findings allow the opportunity for further exploration in a particular area (Nicolson & Fawcett, 2006). Therefore, despite the results of different levels of analysis, findings of research always inform understanding. To clearly explain the theories of developmental dyslexia, a multi-level causal modelling framework (Figure 1) was introduced by Frith (1995) which accounts for diverse theories of developmental dyslexia and classifies them into three main categories or levels, namely biological, cognitive and behavioural. The definition of dyslexia as presented earlier in the second chapter has been challenging. The causal modelling framework introduced by Frith (1995) leads to a clear understanding of different aspects that contribute to dyslexia, and can help clarify issues related to the condition, including some which are far beyond the reading, writing and spelling problems and those with biological and behavioural signs Frith (2002). The causal modelling framework is particularly helpful for those researchers new to the field of learning disabilities as it makes it possible to explain the theories of developmental dyslexia classified into three main levels of explanation and also the impact of the environment on biological, cognitive and behavioural levels.

Different professionals interested in learning disabilities in general and dyslexia in particular have different interests and priorities, the causal modelling framework with its three levels suggested by Morton and Frith (1995) acts as guide which caters for these differences in interest. For example, educational psychologists will focus on cognitive and behavioural levels, while neuropsychologists will focus on the biological or neuroanatomical factors. What makes this causal modelling particularly interesting is that it explains the state of continuous interaction that environmental factors have with the biological, behavioural

and cognitive levels and the impact this interaction leaves on the characteristics displayed by individuals suffering from learning disabilities. Environmental factors here may include the perceived significance of literacy in different societies, demands on literacy, cultural and socio-economic factors, and the type of language and orthography used to explore the occurrence and the manifestation of dyslexia in a particular cohort. Hence, this study attempts to explore the various theories of developmental dyslexia and the unique characteristics of the Arabic languages first, and then investigate how dyslexia is likely to manifest itself in Arabic based on the unique features of the Arabic language and its orthography.

This causal modelling framework establishes appropriate grounds and provides a simple method to explain theories of developmental dyslexia. For instance, deficits in reading and spelling (Catts & Kamhi, 1999; Valdois, 2010) are classified as behavioural theories, while automatization (Fawcett & Nicolson, 1995, 1997), orthographic processing (Hultquist, 1997) and working memory (Gathercole & Baddeley, 1999), general speed of processing (Breznitz, 2003) and phonological processing (Goswami & Bryant, 1990; Goswami, 1997; Snowling, 2000; Ziegler et al., 2008; Ziegler & Goswami, 2005; Dubois et al., 2007; Dubois et al. 2010; Valdois et al., 2003; Valdois et al., 2011; Vidyasagar & Pammer, 2010) are classified as cognitive theories, and brain mechanisms and the cerebellum (Fawcett & Nicolson, 2001; Nicolson 2008), the structure of the cerebellum (Fawcett & Nicolson, 1991; Nicolson 2008), investigating genetic factors (Wolf & Melngailis, 1994; Gilger et. al., 1996; Olson et al., 1989), language areas of the brain (Broca, 1861; Wernick, 1874; Obler & Gjerlow, 1999; Miles & Miles, 1999; Robertson, 2000), deficit in the low-level visual system (Evans, 2001; Everatt, 2002; Vidyasagar & Pammer, 2010; Dubois et al., 2010; Valdois et al., 2003; Bosse, Tainturier, & Valdois, 2007; Bosse & Valdois, 2009; Hawelka & Wimmer,

2008) and abnormal magnocellular pathways associated with dyslexia (Stein, 2001; Stein & Talcott & Witton, 1998; Boets et al., 2008; Goswami, 2011; Georgiou et al., 2010; Landrel & Willburger, 2010; Protopapas & Skaloumbakas, 2007) are considered biological theories.

Figure 2.1: The three- levels Causal modelling framework: Frith 1997

Environment	Biological
	Cognitive
	Behavioural

A brief overview of the theories of developmental dyslexia will be presented in the following section using Frith's (1997) framework of causal modelling. During the literature review, it was identified that different versions of the same theory exist; however, the scope of the review does not allow for addressing these discrepancies. Therefore, this review seeks to describe the most well-known descriptions of each theory, followed by current evidence to support each theory, and a final consideration of the difficulty these theories have in terms of providing a causal explanation for dyslexia.

2.6.2 The Cognitive Level

2.6.2.1 The Phonological Deficit Hypothesis

In the past decade, one of the most significant contributions to dyslexia research has been that deficits in reading were attributed to difficulties in phonological deficits. Over the

last three decades, the phonological deficit hypothesis remained dominant in the field in terms of providing the best cognitive explanation for dyslexia (Snowling, et al, 1986; Stanovich, 1988; Velluntino, 1979; Stanovich & Siegel, 1994; Bosse et al., 2007; Romani, et al., 2011). A huge amount of data supported the hypothesis of phonological disorder as a core factor of reading deficits (Bishop & Snowling, 2004; Ziegler & Goswami, 2005; Blau et al; 2009; Blau et al., 2010). According to Ramus and Szenkovits (2008) this deficit affects three main cognitive abilities which are manifestations of dyslexia: i) phonological awareness, ii) phonological short-term memory, and iii) slow lexical retrieval ability.

Phonemic awareness is a metalinguistic skill which involves efficient understanding of the relationship between alphabetical letters and their corresponding phonemes. Throughout phonological processing children link the speech they hear (phonetic input) with the utterance they produce (phonetic output) (Snowling, 1997). Individuals with adequate phonological awareness skills have the ability to break down sentences into words, manipulate these parts into rhymes, substitute one sound for another, blend sounds together, recognize words as a sequence of phonemes (i.e. /r/a/t) and delete sounds (i.e. blend without the /b/).

A considerable amount of evidence for phonological deficit derives from a seminal study of sound categorization deficit in children with dyslexia. A variety of tasks is used to measure phonological awareness, some of which are counting phonemes, deleting phonemes, substituting phonemes, dividing words into phonemes (Rack, 1994), and detecting the odd sound out in a three- or four-word string (Bradley & Bryant, 1978). In this the researcher presents a series of stimuli (words), such as moon, mouse, mud and house (with house the odd one out based on the first letter), and participants detect and identify the odd word in the

list. In this experiment, children with dyslexia performed poorly on all the tasks presented and were considerably worse in detecting the odd one compared to younger children who had achieved the same level in reading. In 1983 Bradley and Bryant investigated the comparative effectiveness of training in rhyming and alliteration skills (sound categorization) versus training in semantic categorization. In this study, the group of pre-readers who were trained in sound categorization showed more significant progress in reading but equivalent progress in mathematics, providing evidence for a causal link between phonological awareness skills and reading acquisition. Bradley and Bryant's results were confirmed through a series of studies of both normal readers (i.e. Hatcher, Hume and Ellis, 1994) and of children with dyslexia (i.e. Rack, 1985) and have related the ability to rhyme to knowledge of nursery rhymes (Bryant et al, 1990).

The phonological deficit hypothesis claims that dyslexic individuals have a difficulty specifically in the representation, storage and retrieval of speech sounds (phonemes). Major studies on a cognitive level have shown that individuals with dyslexia have difficulty with phonological awareness (Bradley & Bryant, 1978; Bruck & Treiman, 1990; Carrol & Snowling, 2004). Studies reviewed by Ramus and Szenkovist (2008) identified impairments that are specific to the segmental phonology; these are the phonemes which are distinctive in a language. Phonology also extends to the prosody of a language, which is intonation, pausing patterns, and rhymes. Prosodic awareness is developed prior to the development of phonemic awareness (Goswami at al. 2011). Young infants are sensitive to prosody (Mehler at al., 1988) and they incorporate it in their cry patterns (Mampa et al., 2009). Prosody plays a key role in language awareness in infants as pitch variation and pausing facilitate the phrase boundaries' identification (Siedl, 2007), rhyme helps with

identification of syllables (Goswami et al., 2002), and "envelope rise time" frequency of intensity change from vowel onset to intensity maximum (Goswami et al., 2011). Hence, impaired ability to recognise acoustic features of prosodic phonology of a language is associated with difficulties in segmental phonology (Goswami et al, 2002; Goswami et al, 2011).

The phonological deficit hypothesis provides a causal explanation for dyslexia, describing dyslexics' reading difficulties as an inability to store and retrieve the grapheme-phoneme correspondence of the letters with the constituent sounds of speech. This difficulty hinders the basis of reading with an alphabetical system (Bradley and Bryant, 1978; Vellutino, 1979; Snowling, 1981; Castles & Coltheart, 2004) which obstructs progress in learning to read.

Phonological awareness is a fundamental prerequisite for reading acquisition (Ramus, 2004). Ramus highlighted that in cases of mild hearing loss, where the formation of phonological representation, speech perception and production is disturbed, reading acquisition could still take place (Briscoe et. al., 2001), while in cases where mild phonological deficit is present and speech perception and production are intact, learning to read can be a huge challenge. This implies that phonological development is disrupted in dyslexic individuals which in turn leads to poor language acquisition. Additionally, according to Snowling (2000), dyslexic individuals seem to be slow in developing phonemic analysis skills; therefore they tend to underperform in tasks involving phonological awareness such as phonemic segmentation, short term memory, rapid naming, and the manipulation of speech sounds.

Further evidence in support of the phonological theory of developmental dyslexia is the key role of orthography in phonological mappings of reading acquisition (Harm & Seidenberg, 1999; Ziegler & Goswami, 2005; Ziegler et al., 2008). As a result of meta-analysis, Swanson, Zheng, & Jerman (2009) concluded that deficits related to the phonological loop contribute to observed reading and spelling difficulties in children with literacy impairments.

A number of studies of neuro-imaging data, functions of the brain, and its anatomical structure (Paulesu et al., 1996, 2001; 1998; Brunswick et al., 1999, Galaburda et al., 1985; Geschwind and Galaburda, 1985, Demont, Taylor, & Chaix, 2004) support the phonological deficit hypothesis, while others have highlighted phonological processing as a key to reading development. As stated by Nation et al (2004): '*Most current theories of reading development stress the fundamental importance of phonological skills to learn to read'* (2004:342). In fact supporting theorists such as Snowling (2000) recognise phonological deficit as a possible indicator of dyslexia, but are not of the view that there is any causal role in the reading disorder.

Despite the fact that the phonological deficit hypothesis has been widely accepted amongst researchers as the main cognitive deficit in dyslexia, increasing evidence suggests that phonological deficit theory cannot fully explain or account for the causes of dyslexia: other causes such as visual processing might have a great impact on reading acquisition (Vidyasagar & Pammer, 2010). The limitation of the phonological deficit theory is that it does not account for difficulties in 'broader areas of functioning' (McLoughlin et. al., 2002:13). According to Nicolson & Fawcett (1995) it is evident that dyslexic children face difficulties with some skills that are not related to phonological processing such as

"forgetfulness, distractibility and clumsiness" (Nicolson & Fawcett, 1995:20), and there is a consensus amongst researchers that not all poor readers have deficits in phonological processing (Stein, 2004). Additionally, the phonological deficit hypothesis becomes less significant in relation to other factors such as "communication skills, processing speed and self-esteem" in cases of adult dyslexics (Reid & Kirk, 2001; Reid & Kirk 2001: 6). Additionally, there is significant amount of data of dyslexia cases which are not phonological (Dubois et al., 2010; Valdois et al., 2003; Valdois et al., 2011).

Several researchers argue that deficits observed in processing phonological awareness may be due to lower-level auditory deficits resulting from perception of brief or rapid speech and non-speech sounds (Tallal, 1980) or due to visual difficulties and visual attention problems in the perception of motion (Boden & Giaschi, 2007; Hari & Renvall, 2001; Stein et al., 2000), or even a combination of multimodal "auditory and visual" deficit in processing dynamic and transient stimuli (Boets et al., 2008; Hood & Colon, 2004). According to Farmer and Klein (1995), any damage in early auditory pathways affects the quality of phonemic representation, causing disturbances in typical reading development due to the lack of interaction between auditory temporal processing, speech perception/production and reading acquisition.

Challenges to the phonological theory do not dispute the existence of a phonological deficit and its contribution to difficulties in reading, but rather they advocate the fact that the disorder is much more extensive. This leads to a belief in the existence of other links to sensory, motor or learning processes, suggesting that a phonological deficit is not the only possible cause of developmental dyslexia. Some deficits such as difficulty in repeating nonsense words are debatable, whether they can be attributed to phonological deficit or

memory impairment (Gathercole, 1995); similarly, poor performance on Spoonerisms reflects a double deficit in phonology and naming speed (Nicolson, 2008). According to Frith (1997), "*the precise nature of the phonological deficit remains tantalisingly elusive*" (Frith 1997:11).

2.6.2.2 The Double Deficit Hypothesis

The double deficit hypothesis attempts to explain that there are some dyslexics who have a phonological deficit in addition to deficits in identifying visual information rapidly (Bowers & Wolf, 1993; Badian, 1997). Additionally, it suggests that those with a double deficit are faced with further challenges in reading fluency as their access to compensatory skills is limited. According to the hypothesis of double deficit, Rapid Automatized Naming (RAN) and deficits in phonological processing are two distinctive sources of reading impairment (Compton et al., 2001) and are core predictors of developmental dyslexia.

The initial demonstration of naming speed was derived from the "Rapid Automatized Naming" technique (Denckla, 1972; Rudel, 1976) in which a child has to name each stimulus in order on a full page (pictures of colours). It reported that difficulties in naming speed as well as rapid automatized naming constitute further deficits in addition to phonological deficits. In fact dyslexic children show speed deficits on these tasks.

It was also demonstrated that children with dyslexia were slower in choice reaction to both visual flash and auditory tone, in the complete absence of components related to phonological awareness (Nicolson and Fawcett, 1994). Data from an EEG study (Fawcett et

al, 1993) established more direct evidence of slowed auditory information processing: for a pure tone the P3 event-related potential wave was on longer latency in an 'oddball' paradigm.

Yap and van der Leij (1993) established that children with dyslexia required a longer duration of time to read a known word than normally-achieving children matched for age. Van der Leij and van Dall (1999) argued that on the basis of speed limitations, children with dyslexia have difficulty in automatizing word recognition skills, and further this may lead to a strategy for processing larger orthographic units of reading.

Finally, reanalysis of a collaborative study by Wolf and Bowers (1999) proposed an alternative conceptualization of developmental dyslexia, the double deficit hypothesis, by introducing three distinct groups of reading disabled: a) those with phonological deficit; b) those with speed deficit and c) those with both phonological and speed deficit (double deficit). The impairment is of a higher magnitude amongst readers who suffer from (double deficit) phonological deficit and naming speed. The main advantage of the double deficit hypothesis as reported by Wolf (1999) is that it places equal and critical emphasis on both speed of processing and phonological awareness. He suggests that this leads to ensuring that those dyslexics who develop adequate decoding skills and show difficulties in comprehension at a later stage are captured through screening batteries. On the other hand, Wolf concurs that the most evident disadvantage of such perception is that the "*heterogeneity of children with reading disabilities will never be captured by single, double or even triple deficit theory*" (Wolf, 1999:21).

Phonological deficit and speed deficit co-occur (Pennington, Cardoso-Martins, Green, & Lefly, 2001; Schatschneider, Carlson, Francis, Foorman, &Fletcher, 2002). Waber,

Frobes, Wolff, and Weiler (2004) found that all their reading disabled participants with impaired phonological skills also showed deficit in naming-speed. Thus, according to Torgestone (2001) bridging the gap in reading skills between dyslexics and non-dyslexics in is unachievable with remediation of phonological skills alone, as this does not necessarily translate into reading accuracy (Nicolson, 2008). Phonological awareness remediation hardly results in improved reading fluency as it focuses on "*syllable-by-syllable analysis and synthesi*s" (Nicolson 2008:26), it requires reading fluency development through which reading sub-skills are broken down and practised until fluency is achieved (Wolf, 1999).

Supporters of the phonological deficit theory such as Vellutino et al., (2004) argue that the double deficit hypothesis fails to provide anything new, as fluency in reading is not possible with impaired phonological skills and hence the categorization of the four subtypes fails. Nicolson (2008) argues that the research has transformed the phonological deficit into a more general fluency deficit account. According to Ramus (2003) phonological deficit hypothesis include "*fundamental cognitive attributes*" which are speed of processing and verbal working memory. An investigation of the relationship between working memory, speed of processing and verbal ability conducted by Demetriou, Christou, Sanoudis, and Platsidou (2002) revealed that improvements in the speed of processing results in improved working memory and verbal thinking.

2.6.2.3 The Phonological Representation hypothesis

The Phonological Representation hypothesis proposes that phonological deficit in dyslexic individuals may be due to difficulties firstly in establishing and later in accessing

phonological representations (Fowler, 1991; Hulme & Snowling, 1992; Swan & Goswami, 1997).

Phonological information storage during reading involves creating a sound-based representation of the written words in the working memory and eventually in the long term memory. Consequently the outcome of insufficient storage of phonological information is poor representation in memory which in turn results in inaccurate applications of sound rules while reading. Storage of phonological processing in the long term memory is measured through reading tasks on nonsense or unfamiliar words. Individuals with dyslexia depend on how these graphemes are phonemically represented in their long-term memory when reading nonsense or unfamiliar words. They can read words encountered frequently but not infrequent or nonsense words. Therefore, the reading development of dyslexic individuals is constrained and they tend to underperform on tasks of reading nonsense or unfamiliar words due poor storage of phonological information when compared to normal readers (Manis et. al., 1988; Olson et. al., 1989; Siegel & Ryan, 1988; Snowling, 1981). However, other researchers such as Treiman & Hirsh-Pasek (1985) and Velluntino & Scanlon (1987) have failed to identify such discrepancies. Inability to identify discrepancies in the phonological deficit in these cases was attributed to the ease of nonsense words used and difficulty of the test used in the matching of the groups (Rack et. al., 1992). Nation & Snowling (1998) argue that since the semantic and syntactic skills of dyslexics are intact, they can compensate for their decoding deficits to some extent by depending on semantic and syntactic facilitation that is offered through reading a text.

The phonological representation hypothesis has been perceived to offer a causal framework for all cognitive level difficulties observed in dyslexic individuals, mainly deficits

in tasks related to phonological awareness and working memory (Goswami, 2000). Conversely, Nicolson (2008) noted lack of specificity to dyslexia and lack of ability to account for the full range of dyslexia symptoms as limitations of the phonological deficit framework, and the lack of coherence and lack of explanatory force as theoretical limitations.

Additionally, Ramus (2001) argues that '*phonological representation has been insufficiently tested, highlighting fundamental facets of language processing such as supra-segmental knowledge related to syllable structure, stress, rhyme and annotation as well as phonetic regularities, patterns of phoneme assimilation and alternation not being researched'.*

2.6.2.4 Automaticity Hypothesis

Based on their findings related to automatization, Nicolson and Fawcett (1990) have proposed alternative ways of looking at dyslexia. In 1992, Fawcett and Nicolson demonstrated that, in addition to experiencing phonological and/or visual deficits, dyslexic children show problems in their gross motor skills of balance. A child encounters little difficulty when performing a single task; however, significant difficulties were experienced by children when dual tasking or in the absence of visual cues (Fawcett and Nicolson, 1992). In this study, the dyslexic children were found to be either unable to perform the assigned tasks or they took much longer to complete them. This is highly significant for children and adults who are struggling to make sense of more than one linguistic structure and are expected to perform at the same rate and speed as those of the same chronological age when constantly dual tasking. Even though Fawcett and Nicolson did not specifically highlight the issues related to multilingualism, the implication of their argument is that the ability of this

sub-group is going to be considerably weak which will require further consideration in terms of research, policy and effective practice and support.

Automaticity is a pre-requisite for effective learning, automaticity being the process by which learning and response become automatic. Competence in automaticity needs to be established in order to become an effective learner. For instance, the ability to operate a machine without having to think about each activity/move; the ability to tie a necktie without having to consider each move; in the classroom, the ability to spell words without having to consider each and every letter. These skills need to be automatized instead of rehearsed every time there is a need to access them.

2.6.3 Biological Level

2.6.3.1 The Rapid Auditory Processing Hypotheses

The rapid auditory processing theory states that basic auditory deficit takes place in the perception of short or rapidly changing sound (Tallal, 1980). These claims specify impairments of several psychoacoustic measures such as deficit in the auditory temporal judgment involving pure short tone or rapidly varying sounds or syllable pairs (Tallal, 1989; Tallal et al., 1993). Stein et al. (2001) supports the argument that phonological theory is secondary to a more basic auditory deficit, and state that deficit in the neurons of the auditory pathways causes confusion in discriminating letter sounds and eventually failure to master phonological awareness. Poor auditory temporal processing is the primary cause of phonological problems amongst dyslexics (Galaburda, 1999). As inability to hear subtle acoustics that aid discrimination between phonemes restricts the ability to recognise the

structure of the word which in turn affects the phonological skills and ability to read accurately.

Numerous studies have supported this theory due to dyslexics' poor performance in a number of auditory tasks, including binaural processing (McAnally and Stein, 1996), processing sensory auditory information which may lead to 'problems in representing it' Goswami (2000), discrimination of pure tones and low frequency (McAnally and Stein, 1996; Ahissar et al., 2000), and temporal judgment (Tallal, 1980; Nagarajan et at., 1999). In addition, electroencephalographic, magnoencephalographic, MRI and anatomical evaluation of the brain suggest auditory dysfunction in dyslexic adults and children (McAnally and Stein, 1996; Nagarajan et at., 1999; Schulte-Korne et al., 1999; Galaburda et al., 1985; Leonard et al., 2001) which can lead to auditory confusion and result in failure to acquire phonological skills.

While a considerable amount of evidence exists in the literature to suggest a causal link between auditory deficit and dyslexia (Tallal, 1980; Goswami, 2003; King et al., 2003), opposing views argue that not all dyslexics suffer from these auditory dysfunctions to the same degree, therefore they cannot be considered as the main cause of dyslexia (McArther and Bishop, 2001). Additionally, McArther and Bishop (2001) question the validity and reliability of the auditory tasks. They also argue that there is inconsistency between the results of the study and the hypothesis and present rational difference in individuals' ability of auditory processing, age difference, the relationship between the ability of verbal and non-verbal auditory processing. According to Ramus et al., (2003) the auditory deficits apparent in dyslexics have insignificant effects on phonological development, as only 39% of the individuals with dyslexia were found to have a deficit in temporal processing (Gibson,

Hogben, & Fletcher, 2006; Marshall, Snowling, & Bailey, 2001), and performance on auditory temporal processing was not found to be associated with phonological deficit (Georgiou et al., 2010; Landerl & Willburger, 2010; Protopapas & Skaloumbakas, 2007; Hamalainen et al., 2009). In addition, studies have revealed that non-dyslexic matched control children did not outperform the dyslexic children on auditory processing tasks (Muneaux et al., 2004; Richardson e al., 2004). Similarly, Rosen (2003) and Ramus et al., (2003) argued that research does not support the casual relationship between the auditory deficit and literacy and phonological deficits.

2.6.3.2 The Visual Deficit Hypothesis

Reading involves looking at print, therefore, it is imperative to examine factors involved in visual dysfunction (Stanley, 1994). Stein and Walsh (1997) argue that visual impairment causes difficulties with the processing of letters and words on a page of text, which can be evident as a form of binocular fixation, poor convergence (Stein and Fowler, 1993; Eden et al., 1994), or increased visual crowding (Spinelli et al., 2002). The visual theory does not attempt to dispute the existence of a phonological deficit, but rather emphasizes the presence of visual deficits which contribute to reading difficulties in some dyslexics. Evans (2001) note that dyslexic children report more visual symptoms than good readers, some of which are blurred vision, moving print, double vision, omitting words and loosing place; even though, most of the dyslexic children tend to have ‘normal visual acuity’ (Stanley 1994:19). Vidyasagar & Pammer (2010) argue that visual processing might play a

key role in deficit in reading acquisition and that visual and visual attention are associated with reading difficulties in dyslexia (Boden & Giaschi, 2007).

The visual system is divided into two parallel pathways with different functions and properties, namely, the magnocellular (large cells) and parvocellular (small cells) pathways. These pathways link the retina to the visual cortex. According to Stein et al. (2001), 90% of the retina is made up of parvocellular which stimulates fine details of the object and 10% made up of magnocellular in charge of the timing of the visual events. They claim that the magnocellular pathway is impaired in some dyslexic individuals, causing deficits in visual processing, slow flicker sensitivity (Mrartin & Lovegrove, 1987) and abnormal binocular control (Stein and Walsh, 1997; Hari et al., 2001). Lovegrove et al. (1980) highlight the abnormalities of the magnocellular layers of the lateral geniculate nucleus, and psychophysical studies provide evidence to show a decreased sensitivity in the monocellular range and high temporal frequencies in dyslexics.

On the other hand, while studies by Stein and Walsh (1997) support the existence of visual deficits in developmental dyslexia, its effects on reading acquisition were not transparent and remain unclear (Reid & Fawcett, 2004). Similarly, although visual and visual attention difficulties provide evidence of how these deficits impact reading acquisition, it is yet to be established as a source of the reading disorder (Prado, Dubois, & Valdois, 2007; Hutzler et al., 2006). Studies have reported relatively small numbers of dyslexic children with visual deficits (Wright & Conlon, 2009) and are irrelevant to orthographic processing (Chung et al, 2008; Landrel & Willburger, 2010).

2.6.3.3 The Cerebellar Deficit Hypothesis

The cerebellum is a sub-cortical brain structure located in the back of the human brain. It constitutes about 10-15% of brain weight and about 50% of its neurons. It is made up of two cerebellar hemispheres.

In the early 1990s, following the introduction of brain imaging Positron Emission Tomography (PET) scans, it was reported that the cerebellum is a key brain structure for the acquisition and use of cognitive skills including 'language dexterity'. It is responsible for smooth movement, postural maintenance, visually guided movements and motor skills. In addition to problems with phonological functioning and literacy, many dyslexics have problems with issues such as motor coordination and balancing (Fawcett & Nicolson, 1990). The cerebellum could be the prime candidate for the cause of difficulties experienced by dyslexics, as argued by Fawcett and Nicolson (1990). In a dyslexia study assessing a range of skills (Nicolson and Fawcett, 1994) severe deficits were detected in motor skills, balance, phonological skills and rapid processing, a similar pattern to the dyslexic automatization deficit hypothesis. Difficulties experienced by some dyslexic individuals may be due to cerebellar deficits as this is the major brain structure which is responsible for sensory information integration, prediction of muscular outcomes and automatization (Fawcett & Nicolson, 2004).

From a biological perspective, dyslexics have a mildly dysfunctional cerebellum which results in a number of cognitive difficulties. For example: (i) the cerebellum plays a vital role in motor coordination which results in retarded or dysfunctional speech articulation, in turn leading to deficiencies in phonological representation; and (ii) the cerebellum is

responsible for the automatization of learned tasks such as reading, driving and typing. A weak ability to automatize would affect the ability to learn phoneme-grapheme correspondences, and in particular may lead to apraxia of speech, which prevents the smooth and efficient translation of phonology into verbal-motor commands. Finally, (iii) the cerebellum is a support structure for cognitive processes of all types, and therefore its impairment affects the co-ordination of sensory data acquired by the brain.

To provide the underlying causes of developmental dyslexia, two hypotheses were proposed (Nicolson and Fawcett, 1990, 1995 & 2001). One, the Dyslexia Automatization Deficit (DAD) hypothesis, argues that difficulties experienced by some dyslexic children and adults are due to their impaired ability to automatize their skill (motor or cognitive) and this is attributed to cerebellar deficit. The other is the Conscious Compensation (CC) hypothesis, in which they claim that dyslexic children can effectively overcome their automatization deficits by means of conscious compensation, either by working harder or by using various learning strategies to reach task completion (Fawcett & Nicolson 1995; Fawcett & Nicolson 2001).

In their investigation of the automatization deficit hypothesis, Nicolson and Fawcett (1990) focused on examining fine and gross motor skills as these are completely non-linguistic and most likely to be automatized; this ensured that any deficits found were independent of the phonological deficit hypotheses as indicated by them. Consequently, a strong theoretical interpretation was derived (Nicolson and Fawcett, 1990). Nicolson and Fawcett (1995) argue that children with normal ability can learn the phoneme-grapheme relationship to an extent that becomes automatic, while dyslexic children face challenges to reach this level of automaticity: they suggest that phonological deficit can be predicted

through the automatization deficit theory. Nicolson and Fawcett (1995) confirm the significance of the well-supported phonological theory and suggest cerebellum impairment as an additional deficit. Fawcett & Nicolson (2001) state that cerebellum impairment might result in lack of automaticity, lack of coordination, impaired automatic movement, poor sense of time, balance and "immediate recognition of letters and spelling patterns" (Thomson 2001: 81).

A study carried out by Fawcett et al (1996) to explore the correlation between incidents of dyslexia and cerebellar functions (posture, muscle tone, hypotonia of the upper limbs and complex voluntary movement) reported that dyslexic individuals' performance was worse than that of the control group in eleven out of fourteen tasks. They concluded that dyslexic individuals are deficient in cerebellar-based tasks. Their ability to balance while blindfolded was challenged. These findings stress the significance of balance and motor coordination for dyslexic children, a fact which prompted the founders of the theory to include postural stability and bead threading in the Dyslexia Screening Test (DST) (Fawcett & Nicolson, 1997).

In addition to the evidence-based support presented earlier, the significance of the cerebellum deficit hypothesis lies in the fact that it facilitates early diagnosis rather than waiting for the child to fail and a discrepancy measure in reading ability investigated, a delay which could result in unnecessary emotional and mental distress as a result of failure (Nicolson and Fawcett, 1990, 1995 & 2001). Moreover; its ability to identify dyslexics from other poor readers, which cannot be detected employing other traditional discrepancy methods, is an additional advantage.

In terms of a causal relationship between the cerebellar theory and dyslexia, meta analyses conducted by Turkeltaub et al., 2002; Jobard et al., (in press) and studies by Fulbright et al., (1999) confirm that the cerebellum is reliably activated during reading tasks. Recent studies highlight a clear distinction between dyslexic and non-dyslexic adults. Rae et al. (2002:1285) report:

'*The relationship of cerebellar asymmetry to phonological decoding ability and handedness, together with our previous finding of altered metabolite ratios in the cerebellum of dyslexics, lead us to suggest that there are alterations in the neurological organization of the cerebellum which relate to phonological decoding skills, in addition to motor skills and handedness.'*

Further support for the cerebellar deficit hypothesis comes from Marien et al. (2001) as they state that "*the cerebellum modulates cognitive functioning of at least those parts of the brain to which it is reciprocally connected*" (Marien et. Al., 2001:580).

The above studies provide a clear indication that the cerebellum is one of the major brain structures affected in dyslexic individuals; however, studies are yet to reach a consensus with regards to the exact nature of these differences. An immense amount of evidence is emerging in terms of the role of the cerebellum as a result of examining independent theoretical issues. For instance, Paula Tallal's investigation of the brain basis for rapid auditory processing, the study by Facoetti et al. (2001) looking at the processes of attention and attention shifting in dyslexia, Moor and colleagues' (2003) study of attention and automatization, and Nicolson's (2002) report regarding the abnormalities of eye-blinking.

The cerebellar deficit framework received criticism from researchers in the field who attributed the findings to other non-cerebellar causes and claimed that i) cerebellar connection to the frontal lobe was not conclusive, ii) the cerebellum is involved in motor skills but not cognition, and iii) the cerebellum is involved in error elimination but not in skill automatization. Zaffiro and Eden (2001) draw attention to the fact that the cerebellum receives input from various regions of the brain including sensory pathways, and that the dysfunction may be caused by an inability to process a large amount of data rather than faulty processing or cerebellum impairment. Another viewpoint is that the cerebellum is a large structure containing half of the brain's neurons; claiming a causal effect with dyslexia therefore seems somewhat vague. A further criticism is the importance of considering the issue of co-morbidity between dyslexia and attention-deficit and hyperactivity disorder (ADHD). This relates to the fact that the proportion of dyslexics who are affected by motor disorders remains uncertain as a number of studies failed to identify any (Wimmer et al, 1998; Van Daal and Van der Leij, 1999; Kronbichler et al., 2002). Conversely, others have found motor disorders in a subgroup of dyslexics and it was suggested that it is only the case in dyslexics with Attention Deficit Hyperactive Disorder (ADHD) (Yap and Van der Leij, 1994; Denckla et al., 1985; Wimmer et al, 1999). Finally, the relevance of the theory to adults was questioned and related to the difficulty of finding cerebellar signs in adults, bearing in mind that skills improve with age and therefore more sophisticated procedures are needed for such investigation (Needle, Fawcett & Nicolson, 2006).

Nicolson and Fawcett (2006) state that discoveries in neuroscience confirm cerebellar involvement in language and reading activities and support the cerebellar hypothesis; however, the size and the multi-functional nature of this structure weaken this

support. Nicolson and Fawcett (2006) addressed these criticisms by constructing further evidence-based support for the theory to support the notion that the cerebellum is deficient in individuals with dyslexia, and by developing a different framework which identifies the cerebellum as the only possibility.

2.6.3.3 The Magnocellular Theory

Lack of fluency is the main characteristic of reading deficit. However, extensive evidence exists for difficulties related to speed of processing for a substantial amount of stimuli as well as those for sensory delay. Numerous studies suggest that poor processing skills such as phonological awareness and naming speed are due to deficits in lower- auditory functioning of brief rapid speech and non-speech sounds (Tallal, 1980), or due to visual deficit resulted from perception of motion (Hari & Ranvall, 2001; Talcott & Walsh, 2000), or combination of both resulting in a multimodal deficit in processing transient and dynamic stimuli (Boets et al., 2008). Lovegrove (1994) has claimed that children with dyslexia are less sensitive to visual flicker. Tallal and her colleagues (1993; 2002) claimed that, similar to children suffering from language disorders, dyslexic children need a longer time to process rapidly changing auditory stimuli. However; recent studies note that some children may have difficulties with other auditory tasks and Talcott and colleagues found a strong association between children's' phonological skills and their sensitivity to frequency modulated tones. Neuro-anatomical abnormalities have been identified in both visual and auditory magnocellular pathways to the thalamus through *post mortem* examination of the brain (Galaburda, Menard and Rosen, 1994). Fawcett et al.'s (1993) EEG studies have established

direct evidence for abnormal pre-attentional auditory information processing. According to Farmer and Klein (2005) damage in auditory pathways affects the quality of phonemic representations and eventually affects reading development due to the strong relationship between auditory temporal processing, speech perception/production and reading acquisition.

The magnocellular theory claims that dysfunction is not only restricted to the visual pathways but is generalized to 'visual, auditory and tactile' processes (Stein and Walsh, 1997). Findings from scientific studies present so far have been able to explain poor performance from visual, auditory and tactile aspects. According to Stein (2001), the large cells which are responsible for temporal processing exist in all sensory and motor systems. With regards to auditory processing, it is believed that the magnocellular pathways control the processing of auditory stimuli, and therefore any dysfunction in the magnocellular pathways leads to flaws in auditory processing. In terms of visual processing, the M-Cells from one of the two visual pathways show sensitivity to short wavelengths, visual motion, and high temporal and low spatial frequencies. These cells are also affected by associated inputs, such as visual attention. As the cerebellum is involved in receiving input from various magnocellular systems in the brain; it is expected to be affected by magnocellular deficit (Stein et al., 2001). Therefore, through a single biological dysfunction, the theory of a magnocellular deficit accounts for all the recognized manifestations of dyslexia: visual, auditory, tactile, motor; and thus the phonological theory (Hari and Renvall, 2001).

The ability to detect coherent motion and visual stimuli has been the focus of visual magnocellular deficit. In their twin study, Olson & Datta (2002) conclude that twins with reading deficits have higher visual contrast detection threshold outside the lower frequency

magnocelluar range. Boets et al. (2006) note a clear correlation between coherent motion detection and orthographic skills, as we as 2-Hz sensitivity of frequency-modulated tones and phonological skills in a group of 5 year old children genetically at risk of dyslexia.

Vidyasagar (2005) suggests that the magnocellular dorsal route primary role is "gating" incoming information and facilitating processing of visual input through the visual route. Pammer & Vidyasagar (2005) claim the presence of impairment in the dorsal route of sensory processing, suggesting auditory and visual difficulties, while Stein (1997; 2003) suggests a causal relation between magnocellular pathway abnormalities and visual persistence that in turn would lead to specific reading difficulties. Both Stein and Tallal argue independently that there is a pan-sensory magnocellular abnormality that leads to difficulties in most types of rapid processing. Stein (2001) argues that the mechanism through which the magnocellular impairment affects reading is relevant to the role of stability and fixation and the necessity for rapid intermittent eye movements in reading. Any motion and instability in the magnocellular system means that the order of the words is blurred and this leads to inability to perceive letters correctly and consequently to reading difficulties in dyslexics (Stein, 2001). Similarly, Eden et al. (1994) found binocular instability to be correlated with poor reading. It is argued that magnocellular theory relates to abnormalities in the magnocellular sub-systems (medial and the lateral geniculate nucleus) of the visual cortex (Livingstone et al., 1991; Galaburda et al., 1993).

Interesting findings reported by Chase et al. (2003) suggest that colour is a critical component in reading. The colour red appears able to selectively suppress the magnocellular pathways and activate the parvocellular pathways.

The magnocellular theory has faced criticism for its inability to provide explanations and relevant justification for the absence of motor and sensory disorders in a significant proportion of dyslexics (Ramus, 2001). A number of studies have reported that dyslexic readers required significantly higher frequency and amplitude to distinguish varying sounds (McAnally & Stein 1996; Witton et al., 1997), though impairment was not evident on all auditory tasks and some dyslexics were only unable to determine letter sounds caused by problems in the modulations. As highlighted earlier MacArthur and Hogben (2001) failed to replicate findings of auditory disorder and visual disorders (Victor et al., 1993) in dyslexics, claiming that these results are dependent upon participants' age, and individual differences in auditory and visual processing, and that the findings are applicable for a specific group (Witton et al., 1998; Amitay et al., 2002). Some research findings are criticized as they show presence of auditory deficits in a relatively small subgroup of dyslexics (Tallal, 1980; Reed, 1989; Manis et al., 1997).

2.6.5 Conclusion

According to Nicolson and Fawcett (1999), the causal explanation of dyslexia has proved frustratingly elusive. Studies in the field of developmental dyslexia and all the theories and different perspectives presented in this section show evidence for several different contributing factors to dyslexia; these factors include phonology, oral language scores, auditory and visual dysfunctions, and various problems related to the cerebellum. While all these different theories are indeed invaluable, none of these studies seems to have clear findings in relation to the actual causes of dyslexia, nor do they provide a framework broad enough to accommodate all these varying viewpoints. This leaves the understanding of the theoretical framework of dyslexia a challenging task, especially for novice researchers

in the field (Nicolson & Fawcett, 206). Fawcett (2002) states that the high number of conflicting viewpoints in dyslexia research attempting to provide a causal explanation for developmental dyslexia causes major tension. The way forward according to her is to reach consensus on causal theories and address the issues of co-morbidity.

Pioneers in the field of dyslexia had a medical background; therefore they used a "medical model" to offer a causal explanation of the condition and focused primarily on biological explanations (Fawcett, 2002). Fawcett (2002) stated that researchers in the field usually use the "medical model" in their discussions as it offers a clear distinction between the cause, symptoms and treatment; they tend to employ the same model in their investigations as well. This model could potentially lead to the big picture, but only if all three levels of explanation are combined (Fawcett, 2002). Nicolson & Fawcett (2006) argue that while the "medical model" is clear-cut and makes sense in the medical field when exploring the cause, symptoms and treatment of different diseases, it is not as straightforward in the case of dyslexia. Better theoretical understanding, effective diagnosis and remediation methods can be achieved as a result of careful consideration and integration of all three aspects while making a clear distinction between "cause, symptoms and treatment"; this in turn will lead to a clear identification of the causes of dyslexia (Nicolson & Fawcett, 1995; Fawcett, 2002).

Nicolson (2001, p. 22) states that despite the incomparable development in the field since 1990, there is an "*emerging consensus that a broader framework is needed for causal explanation"*. Therefore, it is crucial to identify clearly the true underlying causes of dyslexia (Fawcett, 2002).

Researchers regard Frith's causal framework (1997) as a good starting point as it not only provides a multilevel explanation, but also reflects on the complexity of dyslexia. This approach allows for exploring dyslexia from various viewpoints and in varying contexts.

Nicolson (2002) refers to this current state of theoretical dyslexia research with multi-divergence though focusing on a similar goal as the "dyslexia ecosystem" and expresses the need for unity and cooperation from all specialists to ensure focused, effective and good research with a clear goal.

2.7 Dyslexia and Counselling

Within the limited scope of this section, it is not the intention to describe the different practical approaches to counselling or to summarise the ways in which diverse organisational settings affect the concept. Nor it is the intention to debate the differences between the terms counselling and psychotherapy. Both the terms counselling and psychotherapy are used in this section and in subsequent chapters to refer to the process of intervention aiming to help individuals though talking, listening, thinking and reflecting to overcome their emotional, personal, academic and work related challenges. The main thrust of this section is to identify the key issues in counselling dyslexic adults which counsellors need to appreciate in order to provide effective interventions. Through this process a brief account of the emergence and definition of counselling will be made as well as the specific skills required to offer effective counselling to dyslexic adults.

The concept of counselling in its various forms of interpretation is derived from North America, where it had undergone a long period of development starting from the early 1900s

(McLeod, 1997; Feltham, 1995). In accordance with the traditional approach, it is known as a system for dealing with problems, which require more than casual discussion. Additional attention was drawn to this area due to three fundamental factors which are: a) the emergence of several various forms of helping professions throughout this century such as youth guidance service, social work services, psychotherapy, as well as other caring institutions such as marriage and family counselling; b) the maturity of the empirical psychology and sociology especially with regard to offering explicit techniques and processes for analysis of personal difficulties; and c) the rapid spread of the concept of counselling as specific profession starting from the mid-sixties onwards.

Hence, today, counselling has become a novel area of specialisation, consolidated from various occupational functions with which it has been associated, in response to the deeply felt social needs for individual counselling and support to deal with the maelstrom of social and economic changes. Counselling is a socio-economic process aimed at helping people overcome the difficulties facing them in all areas of life, such as educational, social, vocational or behavioural. According to Feltham (1995), counselling is associated with mental health and it is an extension of the American phenomenon.

The definition of counselling as presented by the BACP (1996) emphasises on the one-to-one activity which is marked by the development of a rapport and empathy, the process which focuses on the client's problems, and it is an equal relationship.

"*The overall aim of counselling is to provide opportunity for the client to work towards living in a way s/he experience as more satisfying and resourceful. The term counselling include*

work with individuals and the relationships which may be developmental, crisis support, psychotherapeutic, guidance or problem solving…" (BACP, 1996)

Rapport is a significant aspect of the therapeutic relationship. Certainly one of the functions of "rapport" appears to be to help individuals towards an integration of themselves into a harmonious system, and as such it is a subjective, emotional process that seems essential to counter-balance the more intellectual, analytical process of problem definition, which is also a common component of the counselling situation.

However; as shown below others such as Maclean (1995) explicitly reveal the problem-centred features of counselling.

"*… a process which takes place in one-to-one relationship between an individual troubled by problems with which he cannot cope alone and a professional worker whose training and experience have qualified him to help others reach solutions to various types of personal difficulties.*" (Maclean, 1995, p. 6).

For the purpose of this section, counselling is defined as intervention processes aimed at supporting individuals with dyslexia make progress in their development both personally and academically. Miles (1988) identified two distinct forms of counselling expertise, "generalist, and specialist" counselling. With the former including skills which are common to all counselling professionals such as being client-cantered and adopting Roger's (1951) notion of "unconditional positive regard", empathic, non-judgemental and good listener. While the later refers to the expertise in the specific area related to the client's condition, for instance those specialists counselling dyslexic individual need to have the dyslexia specific

knowledge in addition to the general counselling skills in order to be able to provide support effectively.

As children, dyslexics go through different experiences at school, with peers, and many types of teachers', peers', siblings', and parental reactions, some of which persist to adulthood according to the results of the International Adult Literacy Survey (Fawcett, 2003). Therefore, in order to provide effective support to adult dyslexics and assist them to overcome their difficulties, it is crucial to understand how dyslexia affects individuals socially and emotionally, what coping strategies they employ whether conscious or unconscious, or what adaptive or maladaptive feelings which have been internalised and carried along since childhoods (Scott, 2004; Reid & Kirk, 2001).

Dyslexic students in higher education have more to cope with than any other groups of students, as they are not only faced with difficulties arisig from the academic requirements and demands of their major which may lead to panic from academic situations such as exams, and presentation anxieties and consequently require additional coping mechanisms to reduce anxiety and fatigue, but also they experience many daily challenges such as meeting deadlines, accessing help, taking notes while listening during lectures, comprehension, the serious challenge of following presentations flashed on the whiteboard along with the lecturers' chain of thought (Simmons and Singleton, 2000), essay writing, peer and isolation problems persisting from school, and others such as lack of confidence, forgetting appointments and misreading information (Scott, 2004; Madriaga, 2007). The amount of distress that dyslexic students experience coupled with their poor concept of time and lack of organization skills may lead them to become confused with project deadlines and exams timing and venues, and frequently lead them to be late for meetings. Due to poor working

memory, dyslexic students face difficulty remembering facts, figures, sequences of instructions and messages. Some dyslexics might have incorrect assumptions, irrational beliefs, or even negative thoughts about themselves, requiring skilled counsellors to challenge these incorrect assumptions and employ effective strategies to help the dyslexics understand the bias in their thinking more consistent with the reality of their disability (Gibson and Kendall, 2011). One example of such distortion in their thinking is that some dyslexics might think that most people are highly capable in spelling and consequently feel that they are worse than everyone else, and feeling overwhelmed with their inability to keep up with their peers (Pollak, 2009). Therefore, dyslexic students require quick support and immediate intervention to enable them cope with both academic and everyday challenges (Miles, 1999).

Singleton's report Dyslexia in Higher Education (Singleton, 1999) emphasises the counselling needs of dyslexic students to overcome academic problems and help cope with negative experiences. As clear in the literature, UK higher education has the best provision for dyslexic students in terms of published advice, research on dyslexia, and support services. In order to successfully address the needs of dyslexic students in the higher education, Singleton's report recommends that:

- Every higher education institution must have at least one counsellor specialised and experienced in dyslexic counselling
- Counsellors working with dyslexic students must have broad knowledge of manifestations of dyslexia and its effects on academic performance and everyday life

- Counselling services should address dyslexic students' short-term and long-term problems, must be available for urgent cases, and early intervention for newly identified cases of dyslexia
- Confidentiality of students' information must be kept at all times and must not be breached without a prior consent from the students and with absolute direction

Early dyslexia assessment, intervention and support is the key to help dyslexic students develop appropriate coping mechanisms and the skills required for improved academic performance and personal development. Early identification guards dyslexic individuals against humiliation and ridicule and protects them from "deep scars" (Morgan and Klein, 2000). 43% of dyslexic students were identified for the first time in higher education, according to Singleton (1999). This is a rather huge percentage of the students in need of immediate intervention and support. According to Singleton's report, higher education is ahead of schools in terms of efficient procedures for assessment and support for students with dyslexia. For those who are assessed for the first time, counselling becomes a significant element in "demystifying" their thoughts and repressed feelings since childhood (DePonio, 2001; Mortimore & Crozier, 2006), understanding dyslexia and its manifestations, and supporting them to cope with academia and everyday life and achieve success. A lack of this understanding of the condition and strategies to overcome these difficulties is a "waste of their time" (McLoughlin et al, 1994). For those dyslexics who have had a difficult childhood with labels such as "lazy" and "stupid", the effects of diagnosis could be complicated; dyslexics might be in a state of shock, might feel angry or sad for having suffered from criticism (Morgan and Klein, 2000; Riddick, 2010; Mortimore, 2006); others

might feel relieved, motivated and empowered (Gold, 2002). The counsellor will need to utilize appropriate approaches to support the dyslexic work through these issues.

Dyslexia diagnosis not only affects the dyslexic individual, but also all significant others (Miles & Miles, 1999). The effect of diagnosis and the reaction of family members need to be taken into account and further explored when counselling dyslexic students, as this reaction plays a vital role in defining how a dyslexic individual will cope, as both over-sympathetic and unsympathetic behaviour and the attitude of other people contribute to the level of confidence, motivation and self-esteem of dyslexics (Scott, 2004).

According to Scott (2004) counsellors working with dyslexics need to have a) the awareness what being dyslexic means, b) the ability to access reading and writing support services, c) the ability to access assessment, diagnosis an follow up, and d) understanding of the best approach and process to counsel dyslexic individuals. Therefore, the best counselling provision for dyslexic students is one that combines assessment, intervention and counselling in a therapeutic relationship which is guided by "specialist" counsellors (Scott, 2004; McLoughlin et al, 2002).

Dyslexic individuals have specific physical characteristics which make them different from non-dyslexics (McLoughlin et al, 2002); they experience varying personal, emotional, academic and work related difficulties; therefore their needs for counselling and support are different from those of non-dyslexics. In order to provide effective counselling for dyslexic individuals, it is significant to have counsellors who in addition to "generalist" skills possess "specialist" knowledge and expertise in dyslexia.

2.7.1 Conclusion

Dyslexia is a complex lifelong biological condition (Singleton, 1999; Bruck, 1989), and its manifestations vary throughout the dyslexic's lifetime (Bruck, 1989). Individuals with dyslexia experience difficulties across the range of tasks they encounter in school and higher education. They are likely to face challenges coping with all aspects of academia, including effortful and inaccurate reading, spelling and writing. In addition, deficits exist in information processing, motor skills and working memory, in turn causing limitations in speech, numeracy and behaviour (Pumfrey & Rosen, 1991).

Coping with the demands of academia can become an extremely laborious task for individuals with dyslexia. They suffer from anxiety (Paget & Reynolds, 1984), and score low on positive well-being and happiness (Casey, Levy, Brown, and Brooks-Gunn, 1992). Several studies revealed that individuals who have difficulty with literacy acquisition show an increased level of anxiety, emotional instability, and poor coping and adjustment abilities (Spielberger et al., 1983; Bruck, 1989; Hales, 1994; Morgan, 1999; Carrol, Maughan, Goodman, & Meltzer, 2005). Therefore, it is crucial that counsellors in higher education institutions dealing with dyslexic students possess, in addition to general counselling skills, "specialist" knowledge about the nature of dyslexia, its manifestations and policies, and the provision for dyslexic students such as exam regulations and appropriate accommodation, as well as understanding the rights and the needs of these students.

Chapter 3

Dyslexia in the Arabic Language

3.1 Introduction

In order to develop an understanding of manifestations of dyslexia in any language, it is imperative to understand fully the relevant linguistic features of that language. This chapter will examine the linguistic and writing features of the Arabic language, including its orthography, morphology and phonology. It will present the structure of Arabic alphabets and writing system and some specific linguistic characteristics shared with other Semitic languages such as Hebrew. Then, the linguistic similarities between the Arabic and English languages will be explored, and finally development in the field of developmental dyslexia in the Arabic language will be discussed.

3.2 Arabic Language: General Overview

Arabic is one of the major languages of the world (Katzner, 2002). It is used by over 300 million people from twenty-two Arab countries located in North Africa, most of the Arabian Peninsula and other parts of the Middle East. The United Nations has six official languages of which Arabic is one. Arabic belongs to the 'Semitic' family which most probably originated in the Sahara and existed around the eighth millennium BC. In addition to Arabic, other Semitic languages are Hebrew, Phoenician, Syriac, Aramaic, Assyrian, Amharic, Maltese, Tigrinya, Tigre, Gurage, Harari and Ge'ez. The alphabetical system of the Arabic language is on the lead as well as being utilized by languages such as Pharsi, Balochi and Kurdish.

According to Holes (1995), Arabic is the second most widely used language in the world for two reasons: a) the spread of Islamic faith in the world, as Arabic is the language of the 'Holy Quran' and worship of all Muslims, and b) Arabic letters are used in other languages such as Pashto, Balouchi, Urdu and Pharsi.

Arabic is practised in three distinctive forms, which are Classic Arabic, Modern Arabic and spoken Arabic (national and local dialects). These three forms of Arabic are not in harmony in terms of phonology, morphology and syntax as they differ in their formation. For instance, certain vowels (e & o) and consonants (ch & g) exist in spoken Arabic but not in literary Arabic. These distinct forms of Arabic have different rules in terms of word order, range of vocabulary used, and sentence structure, and they make use of different intonations such as male, female and plural markings.

Classic Arabic is known to be limited to religious use. Classic Arabic is also referred to as Quranic Arabic, as it is based on the Quran and is used neither in conversation nor in non-liturgical or religious texts. Therefore, those who convert to Islam persist in learning the Arabic language and its script. This form of Arabic is exceptionally formalized and rich, known for its "harmonious patterns, concision and clarity" (Salloum, 2003).

Modern Arabic is used in formal communications and writings. It is considered the official language of all modern publications and productions including the media (i.e. TV, radio, newspapers, news reports etc.). Modern Arabic is the language of instruction in schools and universities (with the exception of private ones) as well as public occasions. It is occasionally used in conversation amongst Arabs from distinct dialects.

Spoken Arabic refers to the national dialect used by all native speakers of a particular region, and the majority of Arabs from one country are exposed to more than one local dialect in addition to literary Arabic. Hence spoken Arabic is practised in two forms, national dialect and local dialect. The former is the national dialect of each Arab State. It is a form of modern Arabic polished by the distinctive features of each country. Each Arab State has its own elite dialect which is normally the dialect of the capital city. Although the geographic location of the country highly influences both formation and pronunciation, Arabic speakers are generally able to understand different national dialects, but the rate of understanding decreases with distance. However, the national dialects of Egypt and Lebanon are widely understood by almost all Arab States; this is attributed to the evolution of the entertainment industry in both Egypt and Lebanon. Modern Standard Arabic is used amongst Arabs when understanding is challenged by differing national and / or local dialects.

Local dialect is also known as Colloquial Arabic, which is commonly used in familial or tribal settings representing distinct accents of the group. Each group/tribe/family within one state and across the Arab world can have its own unique and distinctive local dialect which varies from others. This form of spoken Arabic does not follow any specific sentence structure or grammatical rules.

This brief description of the existence of varying forms of Arabic highlights an important issue facing the monolingual Arabic-speaking Emiratis which is encompassed in the challenges of a diglossic situation. Some degree of diglossia is expected in all languages as there are always some disparities between the standard language and colloquial diversities; however, the situation with diglossia in the Arabic language is that individuals must acquire the basics of classical Arabic in order to ensure access to the news and media broadcasts.

Elbeheri, Mahfoudhi, & Everatt (2009) argue that Standard Modern Arabic literacy is essential for reading. The Education system up to secondary level in the United Arab Emirates, as other Arab countries, has adopted modern standard Arabic as the language of instruction in Federal Government schools. In fact this form of Arabic is different from the spoken Arabic practised at home in both forms (national and local dialects). The majority of teachers of the Arabic language in UAE schools are nationals of other Arab countries such as Egypt and Syria, with a few being Emiratis who come with their own unique colloquial Arabic dialects, a situation which poses great difficulty amongst Arabic learners in the UAE. This area was briefly explored while adapting the Dyslexia Adult Screening Test (DAST) for Emirati Arabic speakers.

The main language of instruction in Federal Government schools (KG to Year 12) is Arabic, with English being taught as a second language. However the language of instruction in almost all Federal Educational Institutions post-secondary education (College and University level) is English; this adds to the complexity of the situation. The language of instruction becomes a huge challenge confronting students and educators in higher education in the UAE. Underperformance is a concern and the need for a culturally-appropriate intervention and support programme becomes a necessity. Designing culturally-appropriate support programmes is not possible without considering issues related to second language acquisition, devising culturally-appropriate assessment tools to examine the features of these difficulties, and considering who would benefit from such support programmes. The current study is designed to address these issues and propose an intervention and support programme for Arabic speaking Emirati college students to be implemented in the Higher Colleges of

Technology. In addition to manifestations of dyslexia, discussion of the issues related to second language acquisition will follow in this chapter.

3.3 Arabic Script and Orthography

Arabic is a Semitic language with a basic 28-letter alphabet. Arabic script is an "Abjad Hawaz" script which is read and written from right to left. It has no capital or lower-case letters: the words are written exactly the same way in any position or sentence. Arabic does not use hyphens. Additional letters are such as /g/, /v/ & /p/ are used in Arabic script when writing foreign names or names of places, but these letters are not represented in Modern Standard Arabic. The 28 Arabic letters consist of consonants and long vowels (see Table 3.2), representing 34 phonemes. There are three long vowels with each having an equivalent short vowel as outlined in Table 3.1. The long vowels (/a:/, /i:/ and /u:/ are represented by the letters *'alif*/ا/, *yā'*/ي/ and *wāw*/و/) are written as a part of the word, while short vowels are represented by diacritic marks/symbols above or below the letters of the word; these diacritic marks are indicated by fatha (aa), kasra (ee.ii) and dhamma (oo):

Table 3.1: Arabic long and shot vowels with a transliteration with pronunciation hint.

Arabic vowels	Type	Position of the vowel	Transliteration
ا	Long vowel	Within the word "Mad Alef"	AA
◌َ	Short vowel	Above the word "Fatha"	A
و	Long vowel	Within the word "Mad waw"	UU
◌ُ	Short vowel	Above the word "Dhamma"	U
ي	Long vowel	Within the word "Mad Ya"	II
◌ِ	Short vowel	Above the word "Kasra"	I

1. Fatha is indicated with a diagonal stroke above the consonant
2. Dhamma is indicated with a tiny comma shape symbol above the consonant
3. Kasra is indicated with a diagonal stroke below the consonant

These diacritic marks are not regarded as independent graphemes such as / ba - بَ /, / bu -بُ / , and / bi - بِ / . “Shadda” and “Sukoon” are two additional diacritic symbols which are placed on the letters forming a word. “Shadda” is a symbol like number 3 written upwards above the letter / بّ / and it is used to indicate doubling the sound of the letter it is placed above. The symbol “sukoon”, which resembles a bubble like a tiny circle above the letter / بْ /, is used to indicate the absence of a short vowel.

The diacritic symbols (short vowels placed above, below & within the body of the word) appear in the holy Quran, poetry and children’s and primary school books. These marks do not make up the words. Nevertheless they indicate pronunciation and ensure correct reading. The presence of these marks identifies the phonological form of Arabic orthography similarly to Hebrew which leads to a complete transparency of orthography-phonology relations. However, when diacritical marks are excluded, as is common in the majority of advanced written material and newspapers, it presents the reader with a challenge to determine whether these double-function letters signify a consonant or a vowel. Arabic is opaque (a characteristic of irregular orthographies such as English) in its unvowelized format.

Below Figure 3.1 and Figure 3.2 is a sample of Arabic script demonstrating absence and presence of diacritic symbols:

Figure 3.1: Sample Arabic script.

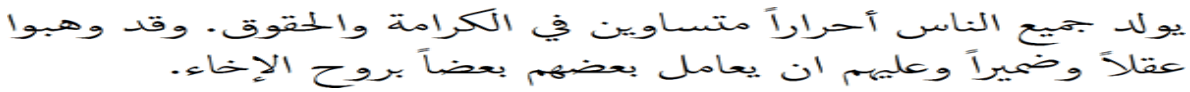
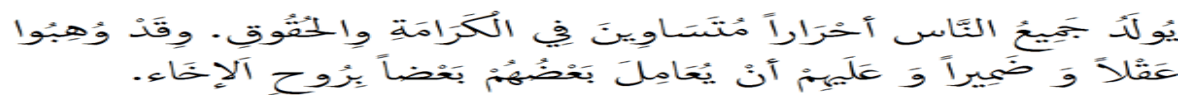

يولد جميع الناس أحراراً متساوين في الكرامة والحقوق. وقد وهبوا
عقلاً وضميراً وعليهم ان يعامل بعضهم بعضاً بروح الإخاء.

Figure 3.2: Sample Arabic script (with diacritics):


يُولَدُ جَمِيعُ النَّاس أَحْرَاراً مُتَسَاوِينَ فِي الْكَرَامَةِ والحُقُوقِ. وقَدْ وُهِبُوا
عَقْلاً وَ ضَمِيراً وَ عَلَيهِمْ أَنْ يُعَامِلَ بَعْضُهُمْ بَعْضاً بِرُوحِ الإِخَاء.

Many of the letters have an identical structure and share the same basic form. They are distinguished only by the absence, number and location of dots (none, one, two or three dots). The exact positioning of the dots is vital as they comprise the main feature of the letter. An example of that would be the Arabic letters representing:

(/ ha - **ح**, / b - **ب** /, / ta - **ت** /, & / tha - **ث** /), absence of a dot as in the /Ha/, one dot in the /b/, two dots in the/ta/ and three dots in /tha/. This distinct feature of Arabic may pose a great challenge amongst dyslexic readers and learners of the Arabic language by affecting their skills in segmentation.

Arabic script is made up of joint letters representing words. It consists of twenty-two connectors (they join to both preceding and following letters such as **ش س خ ح ج ث ت ب ي و ه ن م ل ك ق ف غ ع ظ ط ض ص**) and six non-connectors which are only connected to the preceding letters such as: **(ا و ز ر ذ د**). With the twenty-two connectors, the graphic shape of the letter changes according to its position in the word (in isolation, beginning, middle or

end) as demonstrated in the following paragraph with the letter /b/. However; the six non-connector letters always appear in isolation when present at the beginning of a word, and appear connected from the right when preceded by a connector letter and in isolation when following another non-connector letter, as becomes clear in the following demonstration: initial (rahala **رحل**), end connector (qamar **قمر**), end non-connector (qarar **قرار**), middle connector (Alkhorm **الخرم**) and middle non-connector (zara' **زرع**).

22 of the 28 letters have four shapes, each presenting a complexity in grapheme-phoneme relations. The characters change to some extent depending on their position in the word (beginning, middle, end or isolated). An example of that is the Arabic alphabet representing the letter /b/ in different placements in the words as illustrated in below:

(عبد - لاعب - عرب - بعد). Letter shape is another feature of Arabic orthography which may confront Arabic dyslexics with additional difficulties.

Moreover, in Arabic text one written word may hold more than one meaning in print or normal handwriting. For instance the words "wrote" and "books" are written in the following way " **كُتُبْ** " and " **كَتَبَ** ". The absence of the diacritic symbols leaves both words identical in the written format. Beginners, and in some instances skilled readers, find it challenging to read accurately when the diacritic symbols or the short vowels are missing. For accurate reading and pronunciation, readers revert to the context in which the words appear. This is another specific linguistic feature of Arabic which is referred to as homographic language. This feature of Arabic language (homographic) in the absence of the diacritic symbols leaves beginner and dyslexic readers of Arabic at risk of depending on the context for their own understanding and interpretation. In this case, using single word reading

to test reading accuracy in the absence of the diacritic symbols and context, accurate word reading becomes a challenge and may disadvantage dyslexic individuals; passage reading would be a better indicator of reading accuracy.

Finally, two forms of Arabic writing are introduced in early elementary years of education and are generally used in Arabic scripts, “Naskh” and “Riqa” scripts. “Naskh” means “copying” and this form of writing is widely used in all Arabic speaking countries in producing school and educational text books due to its clarity. However; sometimes shorter scripts are favoured over “Naskh” as it tends to be long and laborious. “Riqa” script is the most commonly used and is known for its clarity and speed. In this script the dots are joined to form a horizontal stroke, and letters are written on top of each other in a way that speed and space are achieved.

Table 3.2: Arabic alphabet with pronunciation hint. Adapted from Awde & Samano (1986).

Name of letter	Arabic form	Transliteration	Guide to pronunciation
'alif	أ	Aa	Fair
baa'	ب	B	Big
taa'	ت	T	Tell
thaa'	ث	Th	Think
Jiim	ج	J	Measure
haa'	ح	H	No equivalent
khaa'	خ	Kh	Scottish loch
Daal	د	D	Dead
dhal	ذ	Dh	Then
raa'	ر	R	Rolled
zaay	ز	Z	Zoo
Siin	س	S	Sew
shiin	ش	Sh	Shall
Saad	ص	S	No equivalent
Daad	ض	D	No equivalent
taa'	ط	T	No equivalent
dhaa'	ظ	Dh	No equivalent
'ayn	ع	'	No equivalent
Ghayn	غ	Gh	No equivalent
faa'	ف	F	Fool
Qaaf	ق	Q	No equivalent
Kaaf	ك	K	Kitten
Laam	ل	L	Love
Miim	م	M	Mask
Nuun	ن	N	Never
haa'	ه	H	Happy
Waaw	و	w,ii	weld, food
yaa'	ي	y,ii	Yell, breeze
Hamza	ء	'	No equivalent

3.4 Arabic Phonemes and Morphology

As demonstrated in the earlier section, Arabic, being a Semitic language, is known to have limited vowels and rich consonantal system. The 28 alphabet letters make up a total of 34 phonemes of which 6 are combination of long (/a/, /i/ & /u/) and short (diacritics) vowelized phonemes and 28 consonant phonemes. The consonantal phonemes of Arabic language usually represent triad voiced, voiceless and "emphatic" in certain sub-sets of coronal set and dorsal set which appear in the Omani dialect. The pronunciation of the consonantal phonemes underwent some variations due to the national and local dialects exhibited by urban dialects outside the Arabian Peninsula, Nomadic dialects and dialects of the Arabian Peninsula continue to maintain the characteristics of the Classical Arabic phoneme inventory. In order to allow accurate description of Arabic phonemes it is crucial to identify a) the exact location in the mouth where the phoneme is produced, b) the part of the mouth which utters the phoneme, and c) the way in which the sound is produced, taking into consideration both the state of the vocal cord as well as breathing trends. The following Tables 3.3 lists Arabic consonantal phonemes and the various parts of the mouth and locations involved in producing sounds of Arabic alphabets.

Table 3.3: Arabic consonant phonemes with description (Alkhuli, 1990)

No	Arabic phoneme	Quality of sound: The trend of breathing	Quality of sound: state of the vocal cords	Place of production	Inter-national phoneme symbol
1	ت	Halting	whispering	Teeth (tip of tongue)	t.
2	ط	Halting	whispering	Teeth/ M (tip of tongue)	T
3	ك	Halting	whispering	Dorsal palate (back of tongue)	k.
4	ق	Halting	whispering	Epiglottis (back of tongue)	q.
5	ء	Halting	whispering	Larynx	Á.
6	ب	Halting	Out-spoken	Upper lip (Lower lip)	b.
7	د	Halting	Out-spoken	Teeth (tip of tongue)	d.
8	ض	Halting	Out-spoken	Teeth/ M (tip of tongue)	D
9	ج	Mixed	Out-spoken	Gum (front of tongue)	j.
10	ف	Friction	whispering	Upper teeth (Lower lip)	f.
11	ث	Friction	Whispering	Between teeth (tip of tongue)	0
12	س	Friction	Whispering	Gum (tip of tongue)	s.
13	ص	Friction	whispering	Gum/ M (tip of tongue)	S
14	ش	Friction	whispering	Gum (front of teeth)	s.
15	خ	Friction	whispering	Dorsal palate (back of tongue)	x.
16	ح	Friction	whispering	Gullet /throat (Root of tongue)	h.
17	هـ	Friction	whispering	Larynx	h.
18	ذ	Friction	Out-spoken	Between teeth (tip of tongue)	o.
19	ز	Friction	Out-spoken	Gum (tip of tongue)	z.
20	ظ	Friction	Out-spoken	Between teeth/ M (tip of tongue)	D
21	غ	Friction	Out-spoken	Dorsal palate (back of tongue)	g.
22		Friction	Out-spoken	Gullet /throat (Root of tongue)	9
23	م	Nasal	Out-spoken	Upper lip (Lower lip)	m.
24	ن	Nasal	Out-spoken	Gum (tip of tongue)	N
25	ل	Single-Sided	Out-spoken	Gum (tip of tongue)	1.
26	ر	Repetitive	Out-spoken	Gum (tip of tongue)	r.
27	و	Slippery	Out-spoken	Upper lip (Lower lip)	w.
28	ي	Slippery	Out-spoken	Frontal palate (front of tongue)	y.

The Arabic language, as other Semitic languages such as Hebrew, possesses the significant feature of applying modifications to the base group of consonants by using vowels. The base group consonants are referred to as consonantal “roots” and are mostly are made up of three letters. Variation in meaning is derived through modification in the consonantal root. In the examples below all the words have the same basic consonantal root ‘LAMASA’ which has the basic meaning of “touching” and includes all the objects and activities involving the action of writing. Hence, all the words in the list share a common basic activity of “touching”.

1. Lamasa **لمس** , he touched
2. Yalmeso **يلمس** , he touches
3. Lamsa **لمسه** , the touch
4. Lamssey **لمسي** , tactile
5. Mulames **ملامس** , attached to
6. Malmas **ملمس** , place of touch
7. Malmassey **ملمسي** , tactual
8. Elmes **إلمس** , to touch

Variation in the meaning is achieved through changes in the basic root as well as the addition of suffix and prefixes. Knowledge of the basic consonantal root system in Arabic supports the ability to recognise basic word roots and the patterns they produce, which will in turn facilitate understanding of meanings and pronunciations of new vocabulary.

Arabic nouns and adjectives are inflected based on number (singular, dual and plural), gender (feminine and masculine), case (nominative, genitive and accusative), and state (definite, indefinite and construct). Singular "Mufrad" is always used with one object, Dual "muthana", is required when referring to exactly two objects regardless of whether they are explicit or not and plural "jama" is used with three or more objects. Arabic has two genders, masculine "muthakar" and feminine "muanath"; verbs and adjectives must always be of the same gender as the corresponding nouns. Similar to other languages such as Spanish which use gender, when referring to people the grammatical gender is always in agreement with the natural gender. However; grammatical gender for inanimate nouns depends on grammatical rules and word formation. Arabic verbs have three tenses, past, present and imperative. The latter is obtained by the addition of suffixes and the imperfect is achieved through adding prefixes and suffixes at times.

The most salient characteristic of Arabic language is its agglutinative feature, that being a single word holding the meaning of a whole sentence in English simply because negative suffixes, tense suffixes, and person prefixes can be added to the single word base. For example, the Arabic word "taamalan", which has a consonantal rood "aml" corresponding to "work", refers to two female workers working in the present tense. In this example one word signifies gender (masculine/feminine), tense (past/present/ or imperative), number (one, two, three or more), and it can also identify objects or people.

Arabic language is characterized by two forms of orthography: deep and shallow. The presence of the diacritic marks in early readings characterizes Arabic language as highly transparent. This feature not only assists in accurate reading and pronunciation, but also provides phonological information and allows access to meanings. On the other hand, its

homographic structure, morphological process and agglutinative feature characterizes Arabic as shallow language. The agglutinative feature of Arabic, even though it provides information about meanings and roots, makes a huge demand on the part of the reader as it requires immense morphological knowledge to break down the word into comprehensible chunks to arrive at its exact meaning.

3.5 Similarities between Arabic and English Language

Linguistic and writing similarities exist between Arabic and English. Orthographies of both Arabic and English use an alphabetic spelling system, each having a standard set of letters with each letter representing a particular sound. The basic alphabet letters consist of a set of consonants and vowels. Grammatical rules are then used to represent speech sounds in writing. Letters with dual functionality exist in both Arabic and English, such as the letter /c/ in the word cinema being pronounced as /s/ rather than /k/. Arabic script uses a cursive style in writing, while joined-up writing is popular in the United Kingdom as well.

Most of the Arabic sounds are also available in English language and vice-versa with only few exceptions. Table 3.4 lists the sounds which exist in both Arabic and English Language. There are some English sounds which do not exist in Arabic, such as v, g and p. The corresponding Arabic sound will be f (v), j (g) and b (p). Similarly, there are some Arabic sounds which are challenging for the English speaker to tell apart such as: (ق & ك) sounds like – k, (ص & س) sounds like – s, (ه , ح & خ) sounds like – h, (ظ & ذ) sounds like- th, and (ض & د) sounds like- d.

Table 3.4: Arabic and English common sounds

Arabic Sound	English Sound	Pronunciation Guide
(ba) ب	B	Bear
(zay) ز	Z	Zoo
(ma) م	M	Moon
(na) ن	N	Nut
(fa) ف	F	Frank
(ja) ج	J	Jam
(laam) ل	L	Ladder
(trilled, is a rolled r) ر	R	Rumble
(tha) ث	"th" (voiceless)	thumb, thorn or thrill
(dha) ذ	"th" dh (voiced)	that, then, or this
(hins) ش	"sh"	Shoe, shine or shake
(sin) س	S	Sun, some or snake
(ta marbuta) ة silent - Modern Arabic ta -Classical Arabic	T	table, torch
(hamza) ء Glottal stop	no symbol	Cockney way of saying Button (Bu-ish)
(ya) ي	Consonant y Vowel ee	C = yes V = bee

Like Arabic, English language includes some words which are written with diacritics (e.g. cafe`) which is read with e ending sound, while in normal English this sound would appear silent. Most of the English words with diacritics are borrowed from other languages such as French. Diacritics in both languages have the same functionality of guiding accurate reading. Dialects and regional varieties exist in English as in Arabic due to the expansion of

the British Empire and the influence of the USA following World War II. Additionally, verb tense and plural markings are also evident in both languages.

3.6 Developmental Dyslexia in Arabic

According to Singleton (1999), dyslexia as a specific learning disability gained international recognition closely linked to literacy development in Higher Education. The manifestations of dyslexia differ across different languages, and it is not language independent (Everatt & Elbeheri, 2007). The perceived importance of education and human development has increased in many societies; this has led many countries, such as Egypt, Kuwait, Bahrain, Lebanon and the UAE, to implement strategies aiming at the reduction of illiteracy. Some of the strategies introduced are evening schools and home schooling for adults; these systems continue to exist to ensure availability of education for those who leave the educational system for any reason. In the UAE, federally funded universities have started offering admission to "mature students", those who missed the opportunity of joining university immediately after completing secondary education.

Empirical studies on learning acquisition and learning disabilities, especially developmental dyslexia in Arabic speaking countries, as well as research on incidents of dyslexia, are generally rare and considered in the early stages. Currently, obtaining an assessment for dyslexia as evidence of a learning disability for an Arabic speaker is a process that is frustrating and fraught with difficulties. Very few trained professionals and services for diagnosis and support are available for the general public. Most of these services are privately owned and hence very costly, making them accessible only to a certain class of people.

Dyslexia in higher education recently became of interest to researchers in English speaking countries and investigations focused on two areas: the extent of occurrence at university level, and possible methods for identification and support (Gilroy & Miles 1996). Thus most of what is known about developmental dyslexia, including its manifestations, methods of assessment, intervention and support, and policy, has resulted from research studies conducted in English-speaking countries, with the majority of participants being speakers of English. Unfortunately, the awareness in the West of the problems associated with reading, literacy acquisition and dyslexia has not been matched in the Arab world and developmental dyslexia remains poorly understood. Culturally-appropriate assessment and diagnostic methods, intervention and support programmes for dyslexia in higher education, as well as policy statements, are currently in the early stages in the Arab world.

In addition to the lack of empirical studies on developmental dyslexia, there is a lack of publications of Arabic educational systems in relation to learning disabilities in general and dyslexia in particular. Therefore, the following section focuses only on the literature available from four Arabic-speaking countries, namely the United Arab Emirates, the Kingdom of Bahrain, Egypt, and Kuwait.

In many Arab countries the Ministry of Education and the Ministry of Higher Education ensure equal educational opportunities for all at secondary and post-secondary levels. However, the educational system in most Arab countries tends to cater for the "normal achieving" population and those with "visible" mental or physical disabilities, while unfortunately those with "invisible" learning disabilities such as dyslexia are grouped together with those students experiencing more general learning difficulties. Consequently, Arabic-speaking dyslexics remain disadvantaged in receiving appropriate support and

intervention, as most of the diagnostic assessments of learning difficulties in Arab countries such as the UAE, Kingdom of Bahrain and Qatar merely focus on academic achievement standards set by the Directorate of Curriculum in the Ministry of Education. Students achieving below the average in academia are then placed in special education programmes which are limited to primary education only (ending at grade 5 in the UAE and grade 3 in Kingdom of Bahrain) with the exception that some private schools cater for bilingual Arabic speakers. Generally, identification and support mechanisms for secondary and post-secondary students are scarce.

In the last few years development in the Arabian Gulf and the prosperity of the Gulf States has attracted many Westerners to the region, the communities and schools. Many of these expatriate educators came with a broad knowledge of learning disabilities and this has helped issues related to literacy acquisition, and developmental dyslexia in particular, to surface. Awareness of this phenomenon became widespread amongst educators, students, parents and policy makers. This awareness has led to a) interest in empirical studies on developmental dyslexia in Arabic, and b) establishment of institutes for special education, Dyslexia Associations, and learning disabilities centres across the Gulf region and the Arab countries aiming at ensuring appropriate identification, diagnosis and support. Most of these centres cater predominantly for English speakers as the tools are largely imported from English speaking countries. Many educational psychologists in English-speaking schools and in the special needs centres are faced with an immense challenge when diagnosis is required for a native speaker of Arabic. There is a notable percentage of native speakers of Arabic who join English schools and may show signs of dyslexia; challenges due to the lack of a culture-appropriate assessment for dyslexia in Arabic then emerge, as the norms

accompanying the imported diagnostic assessments are foreign and accurate diagnosis becomes impossible. Additionally, the general awareness of developmental dyslexia and the availability of services continue to be limited only to a certain group of students; those enrolled in the private sector. This highlights a pressing need for dyslexia identification in Arabic taking into consideration the language and the culture of this population.

Interest in culturally-appropriate diagnostic assessments for developmental dyslexia increased amongst researchers especially after the emergence of cross-linguistic studies in the West. Arabic researchers in turn became interested in the field of developmental dyslexia, aiming to identify culturally-appropriate diagnostic assessments for dyslexia in Arabic as well as appropriate support mechanisms. As a result, there are some diagnostic assessments available in Arabic which have mostly been developed in Egypt using Egyptian monolingual Arabic children. These include: a) the Arabic dyslexia diagnostic tests (Gigil, 1995) designed in 1993 as a part of PhD study in Tanta, a Governance in the Nile Delta of Egypt; b) the ADTI Sirs Ellayan Silent Reading Test (Arabic Dyslexia at Risk Indicator), which is an Arabic standardized literacy test developed in Egypt; and c) the Non-verbal Reasoning - Pictorial Mental Abilities test, which examines both cognitive abilities and educational attainment.

Empirical studies concerning dyslexia in Arabic language focus on linguistic duality (Ayari, 1996; Mansouri, 1998; Abu Rabia, 2000); orthographic transparency and the role of diacritics, and effects of vowels on reading accuracy in the Arabic orthography (Abu Rabia, 1998; Azzam, 1990; Elbeheri, 2004; Elbeheri & Everatt, 2007; Abu Rabia, 1999; Abu Rabia, 2001; Abu Rabia, 2007).

Some of the findings of research studies in Arabic agree with Western research in terms of occurrence and causes of dyslexia. Al Mannai and Everatt (2004; 2005) argued that there are similar causes of dyslexia in both English and Arabic speakers and that a common causal pathway exists across different languages. Studies by Al-Mannai & Everall (2000) and Elbeheri (2004) report that non-words, pseudo-word reading tasks, phonemic segmentation, rapid naming and rhymes are indicative of difficulties associated with reading and writing in Arabic. According to Abu Rabia, Share & Mansour (2003) phonological awareness is indicative of dyslexia in Arabic and the framework of difficulties associated with learning to read and write in English is partially to Arabic. Phonological processes are predictors of dyslexia especially with regard to phonological awareness and phonological decoding (Elbeheri & Evertt, 2007; Abu Rabia et al., 2003; Hamdan & Amayreh, 2007; Elbeheri et al., 2006). Additionally, Elbeheri & Everatt (2007) argue that this predictive feature of phonological deficit tends to be different depending on the stage of reading. In the early years of reading phonological awareness does not particularly predict dyslexia in Arabic as it does in English, due to the nature of Arabic orthography (Elbeheri, 2006). Saiegh-Hadded (2005) suggests that phonological awareness affects the speed but not the accuracy of vowelized and non-vowelized reading.

In 2002, the Kuwait Dyslexia Association conducted a nationwide study examining the prevalence of dyslexia in Arabic-speaking populations and reported a 6% occurrence amongst Kuwaiti nationals (Kuwait National Dyslexia Association, 2002). However, in 2006 a higher prevalence rate (20%) was reported amongst Kuwaiti offenders (Elbeheri, Everatt & Al Malki, 2006).

The Egyptian Dyslexia Association (EDA) introduced two types of dyslexia assessment in addition to an intervention programme: an early dyslexia diagnosis system which is achieved through administration of Arabic Lucid CoPS (Cognitive Profiling System), and a computerized assessment targeting children aged between 4 and 8 years old which guides intervention through understanding the strengths and weaknesses of a child. CoPS was developed and is widely used in the UK. It is available in many languages including Arabic. CoPS is currently used in Kuwait also. Egyptian children aged 8 to 11 years have the opportunity to be assessed through the administration of an Arabic screening test developed in-house, and a check list, which is also based on identifying weaknesses. In addition, the EDA provides an intervention programme for dyslexics in Arabic and English using a multi-sensory approach.

The Emiratis Dyslexia Indicator Test (EDIT) was developed at the UAE University as a screening tool for dyslexia in Arabic. The EDIT was based on the Reading Success Lab diagnostic tool with some modifications, targeting bilingual Arabic speakers.

Findings from the study "Use of Dyslexia Adult Screening Test in the United Arab Emirates" which I conducted in 2007/2008 at Higher Colleges of Technology in the UAE as an MSc project and following the results of this PhD study resulted in a special needs policy statement, and the establishment of the Assistive Technology Centre and Foundations Success Centre at Dubai Women's College.

In 1984, the Centre for Child Evaluation and Teaching was established in Kuwait. The establishment of the centre was influenced by a Kuwaiti mother who had children suffering from learning disabilities. They failed to find appropriate support in the country

and were forced to travel to the USA and UK for an appropriate diagnostic assessment and remediation plan. The CCET started as an assessment unit providing one-to-one tuition and remediation plans for evening lessons. In 1994, CCET started day remediation programmes in cooperation with the Ministry of Education with fully-equipped classroom, music and gym facilities. In addition, the service unit expanded to include an Assessment Unit, Test Development Unit, Remediation programmes, Training Unit, National Helpline, and Learning Disability Library.

Kuwait Dyslexia Association (KDA), the first dyslexia association in the Arab world, was established a decade ago. KDA is a pioneer in introducing Dyslexia-friendly schools and short-term memory treatment programmes, devising technical screening tools, and currently working on dyslexia identification programmes (Lass Junior 8 to 12 years old and Lass Secondary 12 to 18 years old, in addition to Arabian Dyslexia Association).

It is clear from the above illustration that most of the research studies and initiatives in support and remediation in the field of developmental dyslexia in Arabic focused mainly on children, neglecting students in Secondary and Higher Education, even though it is well established in the West that developmental dyslexia persists into adulthood (Bruck, 1990). Although compensation skills may assist to overcome some aspects of the deficits, permanent "cure" of the condition is not a reality; performance might especially be influenced by secondary effects of dyslexia such as low self-esteem, frustration and lack of confidence (Riddick, Farmer, & Sterling, 1997).

Since English is the Language of instruction for higher education in the UAE, as highlighted earlier in this chapter, it is equally significant to explore issues related to second

language acquisition. Therefore, the following section provides discussion on the dilemma in identification between dyslexia and English as a second language.

3.7 Dyslexia and English as Second Language

As highlighted earlier, all the research studies pertaining to developmental issues discussed in this PhD thesis focus on the English language spoken in the United Kingdom, United States, Canada, Australia and other English-speaking countries. Manifestations of dyslexia in other languages are not understood due to the limited amount of academic research studies in this area compared to English-based studies (Miles & Miles, 1999). Thus, as highlighted previously most of what is known about developmental dyslexia is unique to the English language. The gap in current practices with regard to culturally-appropriate assessment and remediation for dyslexic individuals and consideration for issues related to those whose native language is not English is obvious (Baker, 2001). However; interest and collaboration between researchers in different countries is growing to achieve this understanding. Particularly, the BDA conference on multilingualism and dyslexia in 1999 was followed by a conference in Washington DC in 2002 which paved the way to further promote culture-fair assessment for speakers of languages other than English, and those who have English as an additional language (Cline, 2002).

Students at different educational levels experience academic difficulties particularly with reading, writing and/or spelling when the language of instruction at school differs from their native language or from the language spoken at home. It becomes crucial to understand whether these difficulties are difficulties related to second language acquisition or are attributable to dyslexia, as dyslexia symptoms can be easily camouflaged with deficits in

language proficiency if not correctly diagnosed (Siegel & Smythe, 2003). Accurate identification of dyslexia is achieved through culturally-fair standardized tests which account for literacy attainment (reading, writing and spelling). Discrepancy between reading and chronological age resulting from inadequate performance on tests of attainment coupled with normal IQ in the absence of social, emotional or neurological difficulties may be regarded as dyslexia when individuals are taught in their native language, or when the language of instruction is the same as the language spoken at home. However, the process of dyslexia identification becomes compounded when individuals are tested in a language other than their native language (Cline & Shamsi, 2000). It is a highly complex task to distinguish between general language disabilities which manifest in any language and difficulties related to a second language. Is poor performance due to dyslexia or is it difficulty in acquiring a second language? Many researchers have attempted to examine this concern and provide apposite recommendations, some of which are discussed below. IQ testing is another issue to be considered for the same reasons highlighted earlier relating to both language and culture. Most of the assessments are culturally biased, being developed mainly to cater for speakers of English. They are inappropriate for utilization in a multi-lingual setting unless appropriate modifications have been applied.

Appreciation of the specific linguistic features of the native language is the key when identifying dyslexia in a second language setting. Dyslexia manifests itself differently in different languages. Some languages have specific agglutinative features which add additional inflectional characteristics to the word endings (Miles & Miles, 1999). Other languages have derivational morphology in which words consist of a consonantal "root" and a vocalic "pattern" where the root is made up of three consonants that signifies the Semitic

core of the word, similar to Arabic and Hebrew (Miles & Miles, 1999). The writing system differs in each language, with some languages using the alphabetical system while others like Chinese and Japanese use a morphemic system in writing. The degree of language transparency differs from one language to another. Language transparency refers to the degree to which each grapheme maps only on to a single sound (phoneme). Languages are considered transparent when the grapheme-phoneme relationship is straightforward and less so as this relationship becomes more complex. Some languages, such as Arabic and Hebrew (strictly when vowelized as discussed previously in this chapter), Welsh, German, Spanish, and Dutch are more transparent than English.

The English language is considered to be highly irregular (opaque) in its transparency due to a) phoneme-grapheme relationship - more than forty phonemes are generated from only a twenty-six letter alphabet; b) change in pronunciation due to a grapheme addition (such as pal vs. pale); c) individual words lacking agreement between pronunciation and spelling rule; and d) pronunciation of some initial letters require pre-decoding (such as care vs. cinema, three vs. tree and, thin vs. there), and e) contains idiosyncratic words (such as yacht); additional examples can be found in Geva & Siegel, (2000).

Greek and French are not overall regular languages and are considered somewhat opaque. Their orthographies are transparent for reading and not so for spelling. However, each of the two languages poses a different challenge. For instance, in French, when reading, each phoneme is associated with one grapheme only, though spelling is more challenging as each phoneme can be written in more than one way. French words are sensitive to the context and are influenced by the initial vowels in following words (in a context or sentence) leading to reduction of transparency for spelling (Bruck, et al., 1997). Similarly, the

phoneme/grapheme relationship is transparent in Greek orthography; however, irregularity is seen in spelling due to modernization of speech while the writing system remained unchanged from its ancient system, with multiple forms of vowel spelling which require additional morphological knowledge.

In the German language regularity between reading and spelling is evident. Graphemes are always pronounced in the same way regardless of their position in a word or even the length of the vowels. Dutch and Italian display similar transparency in their orthographies.

Studies of different orthographies have focused on three aspects: a) the role of phonological awareness in the first language acquisition; b) the role of phonological awareness in second/additional language acquisition; and c) the role of phonological awareness and transparency in predicting second language acquisition. This information can be utilized to inform culturally-appropriate diagnostic tests for speakers of languages other than English and provide accurate dyslexia diagnosis in a second language setting.

Landrel, Wimmer & Frith (1997), in examining reading acquisition and phonological processing abilities among English and German dyslexic children, found that German dyslexics performed better on reading tasks than English dyslexics. They were able to read up to three-syllable infrequent words accurately and showed mastery in reading the corresponding non-words. The English dyslexic children made more errors in reading and their reading accuracy was affected by word frequency and the number of syllables. Reading accuracy of English dyslexic students dropped with long and infrequent words. This implies that the effects of phonological deficits in irregular orthographies such as English language

tend to be more drastic than in more regular orthographies such as German. The main contributing factor is the degree of transparency in the phoneme-grapheme relationship in the two languages. The transparent nature of the German language and consistent relationship between phonemes and graphemes strengthened and improved the ability of the German dyslexic children to decode infrequent and non-words. The English dyslexic children lacked the decoding experience which greatly impacted on their performance on infrequent and non-words. This is merely attributed to the nature of the English language orthography being less regular in its phoneme-grapheme relationship than the German.

Individual differences between different groups of children who speak English as a second language were examined in several studies (Wade-Woolley and Siegel, 1997; Smythe and Siegel, 2003; Landrel, Wimmer & Frith, 1997; Wimmer, Landrel, & Frith, 1999). The native language was found to determine how easy or difficult acquiring proficiency in English language would be (Smythe and Siegel, 2003). Therefore in order to identify signs of dyslexia in any language it is imperative to appreciate the specific linguistic features of that language (Goulandris, 2003).

Spencer (2001) argues that transparent orthographies are highly efficient which consequently reduces demands on memory and involves limited activation of brain regions. This feature of transparent orthography in turn allows dyslexic children easy access to information. Deeper and more opaque orthographies have an increased demand on memory which requires larger activation of brain regions and limits accessibility of information to dyslexic children.

Smythe and Siegel (2003) examined this phenomenon with a group of children with six different native languages: Chinese, Pharsi, Slavic, Japanese, Romance and Tagalog. The findings of this study showed that children who spoke uninflected languages such as Chinese and Japanese scored relatively lower on English syntax tasks than those who spoke Slavic languages. Children with a Slavic language background out-performed native speakers of English mainly due to the Slavic language being highly inflectional, while Chinese and Japanese children in some cases performed better than the native speakers of English on word-reading, but performed poorly on phonological tasks. These results show that there is a clear association between the level of transparency of a first language and the level of complexity in acquiring the second language.

Guron (2002) suggests that word decoding skills in the second language can develop rapidly regardless of the first language given that adequate phonological skills are evident. Findings from a cross-linguistic analysis involving the nature of the language and the range of skills required for reading in different languages emphasize the significance of the process of reading and spelling acquisition in addition to the cognitive skills involving literacy acquisition, (Goulandris, 2003) confirming the findings of the study conducted by Smythe and Siegel (2003), and implying that the linguistic features of the first language influence achievement of second language proficiency. Smythe (2002) highlights the need for a holistic approach in assessment and remediation as a more effective practice.

Phonological training of dyslexic children has shown promising results in terms of achieving reading accuracy. A longitudinal study reported that phonological awareness training increased reading acquisition by eight months and spelling acquisition by seven months (Bradley and Bryant, 1983). In addition, a group of English children from grades 1

to 4 participated in a phonological training study conducted by Landerl (2000). Performance of these children on non-words was improved and their reading accuracy increased. The accuracy of reading non-words and their speed was reported to be in line with German children.

Hence, the studies outlined in this section imply that poor readers in more regular orthographies can rely on the consistent patterns of phoneme-grapheme relationships to decipher letters which make up different words. This linguistic feature results in increased reading accuracy amongst children from transparent orthographies compared to those from irregular orthographies such as English. While the rate of accuracy is relatively high, the speed of reading remains low (Landrel, Wimmer & Frith, 1997; Wimmer & Cossu, 1993). Literacy attainment of dyslexic children from irregular orthographies can be improved through training on phonological awareness. Phonological awareness training is seen to improve literacy accuracy and speed of the phonological processing of dyslexic children from irregular orthographies to become more in line with performance of dyslexic children from more transparent orthographies based on tasks. Dyslexic children from more transparent orthographies are equipped with decoding skills due to the consistency of phoneme-grapheme relationships. Second language acquisition is highly dependent on the orthography of the first language. Therefore, there are two factors to consider when attempting to diagnose dyslexia in a second language setting: a) the specific feature of the native language, and b) the availability of a culturally-appropriate assessment test which takes into consideration both the language and the culture of the individuals being tested.

3.8 Conclusion

This section outlined specific linguistic features of Arabic script and orthography and highlighted challenges which could impede the performance of monolingual readers and learners of Arabic. From the description of the nature of the Arabic language and its scripts one can conclude that the Arabic writing system is almost entirely phonemic (Elbeheri, 2004). Therefore, the absence of orthographic signs with phonological significance presents readers of Arabic with huge difficulties (Azzam, 1990).

Arabic orthography tends to be irregular in its transparency; although in early readings diacritic symbols are present to support beginner readers and ensure increased reading accuracy and comprehension, both the cursive and the homographic nature of the language hinders accurate comprehension and reading accuracy. The cursive feature of the orthography requires mastery of all specific features of the Arabic orthography and script to minimize confusion and ensure accurate reading and comprehension. Additionally, varying writing systems (Naskh and Riqa) together with connector and non-connector letters may also result in confusion amongst young readers and learners of Arabic language as well as dyslexic individuals. The cursive nature of Arabic orthography coupled with the additional knowledge of connector and non-connector letters and inflected morphological process confronts Arabic dyslexics with additional complexities and challenges, as each of these processes requires sufficient knowledge to break down a word into its roots to facilitate accurate reading, writing and comprehension.

Through exploring the specific linguistic features of Arabic, particularly its orthography and morphology, this chapter attempted to provide a rationale for the expected

manifestation of dyslexia in the Arabic language. It also provided some insight into the challenges facing Arabic-speaking students in language and reading acquisition as well as the expected form of reading disabilities in this population. Consequently, this information could be used to identify suitable subtests in devising a culturally-appropriate assessment test and examining manifestations of dyslexia in Arabic; however, this is achieved through conducting preliminary studies discussed in Chapter Five.

Despite the efforts of the Educational authorities in the Arab world in general to raise awareness of learning disabilities and to ensure equal education for all, progress on developmental dyslexia in Arabic is still in its infancy. Scientific studies on Arabic reading acquisition and literacy, as well as the challenges facing Arabic dyslexics, are thus far very rare. Very little research is available concerning the process of reading Arabic from cognitive and psycholinguistic perspectives. Currently available studies concentrate on linguistic duality (Ayari 1996; Mansouri 1998; Abu-Rabia, 2000); the role of diacritics for beginning readers (Azzam, 1990); and effects of vowels on reading accuracy in Arabic orthography (Abu-Rabia, 1998). Much of the research and remediation programmes focus on issues related to developmental dyslexia in children. Consequently, secondary level students and students in Higher Education continue to suffer from the lack of an appropriate diagnosis, support and appropriate disability allowance. In order to better understand the primary principles and procedures required to devise a culturally-appropriate dyslexia assessment in Arabic, a more consolidated effort in examining the issues of dyslexia assessment, identifying gaps in the policy, practice and support, is required.

In addition to valid and reliable culturally-appropriate diagnostic assessment, the central point in multilingualism and dyslexia diagnosis is understanding the significant

features of that language and the processes involved in literacy acquisition. Therefore, in order to identify dyslexia in a second/additional language setting, as in the case of students in the Higher Colleges of Technology who speak English as a second and in some cases as an additional language, knowledge of the specific feature of Arabic orthography and the processes of literacy acquisition in the Arabic language is vital.

CHAPTER 4

Dyslexia in Higher Education

4.1 Introduction

Dyslexia has received international recognition as a specific learning disability which is closely linked to literacy development in Higher Education (Singleton, 1999). Manifestations of dyslexia include deficits in literacy acquisition (reading, writing and spelling, difficulties in comprehension, note taking, timetabling, completing tasks, and organizational skills: a detailed list is available on the BDA website, SpLD Working Group 2005/DfSS Guidelines). Difficulties may also be observed as deficits in short-term memory and visual processing (Fawcett & Nicolson, 1994; Beech & Singleton, 1997). As a result increased frustration, low self-esteem, lack of self-confidence and problems in interpersonal relationships tend to be the secondary effects of dyslexia facing dyslexic individuals.

The importance of literacy development for "all" has been recognized in all countries world-wide and many countries are attempting to implement strategies to reduce the rate of illiteracy amongst their human capital (Firman, 2000). The increase in conceptual awareness of the significance of literacy has resulted in promoting literacy initiatives in different countries such as the "Reading for All" programme in Egypt and the "Education for All" programme by UNESCO Educational Regional Headquarters in Lebanon. Initiatives in the US consisted of two programmes "American Reading For All" and "No Child Left Behind". It also elicited systematic inquiry of the nature of literacy and prompted research into problems associated with literacy acquisition. Recently, the prevalence of literacy acquisition problems and dyslexia in higher education and appropriate support methods has become the

subject of research in English-speaking countries. This has resulted in better understanding of the nature of dyslexia in adults, and has informed appropriate identification methods for adult dyslexics, together with appropriate intervention, support and policy statements.

Internationally the number of dyslexic students in higher education is gradually increasing. The prevalence rate of dyslexia in higher education institutions in English speaking countries underwent a dramatic increase, approximately 41%-47%, in the years 1994 to 1996 as reported by Dearing (1997). The percentage of students with dyslexia in US higher education was 2.4% in the year 2000 and increased to reach 5% in the year 2005, according to the Higher Education and Adult Training for people with Handicaps (HEATH, 2001). In the UK as well, the number of dyslexic students in higher education has been increasing since 1993. As reported by the Higher Education Statistic Agency (HESA), 1998; Singleton and Aisbitt, (2001) the number of dyslexic students in higher education in the UK was 1.3% during the academic year 1996-1997, then increased to reach 2% in the academic year 2001-2002, and just below 5% in 2005. Currently it is estimated that the number of dyslexic students in UK higher education is approximately ten times more than what it was reported to be in 2005 (AHEAD, 2008). The extent of the problem has become increasingly recognized by Education Authorities in the UK and a report on the provision needed for dyslexic students in the UK higher education to perform optimally at university level was brought forward (Singleton, 1999).

Despite extensive research in the field, uncertainties exist amongst administrators of the Disabled Student Allowance (DSA) due to the complexity of the condition and the limited knowledge of the DSA administrators (Singleton, 2005).

In the UK, dyslexia is recognized as a Specific Learning Difficulty (SpLD) along with Dyscalculia, Dyspraxia, and Attention Deficit and Hyperactivity Disorder. A clear system for Disabled Student Allowance (DSA) for identification of SpLD in Higher Education was established following direction from the Local Education Authorities (LEA) to ensure national consistency in DSA and limit delays in application processing. This new framework was phased in over a three-year period (2006 to 2009). Guidance, timelines and a procedure for the transitional period were published.

The DSA system followed in the UK, in addition to being quick and simple to administer, is easily accessible to students requiring evaluation, ensures accurate diagnosis, and is good value for money. The current DSA framework includes the following:

1. Suitable tests for assessing SpLD in Higher Education
2. Suitable qualifications and training for SpLD assessors
3. Diagnostic Criteria
4. Format of SpLD reports
5. Assessment of students with English as an additional language

4.2 Suitable tests for assessing SpLD in Higher Education

A suitable assessment of SpLD in higher education is the key for the National Assessment Framework for Applications for DSA. A list of suitable assessments is made available to ensure national practice is consistent in awarding DSA allowance. The list of suitable assessments for SpLD consists of both closed tests strictly administered by psychologists and open tests which are suitable for the use of specialist teachers. The list was

identified based on the following principles: a) inclusion of tests to examine literacy attainment and cognitive profile as well as numeracy when appropriate, b) use of valid and reliable standardized tests aimed at adults, c) use of tests consistent with SpLD theory which account for cognitive functioning, and d) inclusion of additional supplementary information on conditions such as dyspraxia, DCD and disorders of attention completed by qualified professionals or from a recognized checklist. LEA Awards Officers authorize DSA application when reports are completed by approved assessors containing apposite evidence of SpLD using tests from the list. However; alternative tests may be used as deemed necessary, given that a rationale is included in the DSA report. A sub-panel of members has been appointed to periodically review and update the assessment list of SpLD in higher education.

4.3 Suitable qualifications and training for SpLD assessors

SpLD assessments require interpretation of the results. To ascertain consistency in the quality of DSA application reports for SpLD in higher education submitted by different professionals it was deemed necessary to ensure that a fully qualified and trained person had administered the test. This practice determines suitability of the report, eliminating the need to evaluate reports individually based on test selection and results which will in turn minimize delay in DSA application processing. A range of approved and suitable training and certifications was proposed which agree with the following framework: a) post-graduate training with a combination of principles of psychometric testing and practical case experience, b) training to consist of theory, discussion and practice, c) on-going professional

development, d) acquiring a licence and renewing it, e) receiving peer supervision and mentoring, and f) including a statement of qualification and compliance with the guidelines in the report. Additionally, scope of certification and four routes to a SpLD Practising Certificate were established with each having a set of unique requirements required to be achieved prior to certification award (refer to the flow chart below, Singleton, 2005) : a) Applicants with memberships or post-graduate qualification entitling them to membership of their relevant professional body, b) Applicants with prior learning or experience, c) Applicants with SpLD specialist teacher training, and d) Applicants who have no SpLD specialist training. Moreover, the BDA Accreditation Board produced guidelines for training bodies based on the standards proposed by the SpLD working group and identified procedures for course accreditation.

4.4 Diagnostic Criteria and format of the report

SpLD cover dyslexia, dyscalculia, dyspraxia/DCD and attention deficit disorder. Diagnostic reports should be clear and in a consistent format with sufficient evidence of SpLD to facilitate for DSA. The selected tests should be reliable, valid and standardized to an adult population. When possible they should be drawn from the list suggested by the SpLD working group; alternative assessments will be accepted given that appropriate justification accompanies the diagnostic report. The evidence included in the diagnostic report should comply with the definition of the specific SpLD condition and the diagnostic criteria. This will allow the student support officer to determine the suitability of the DSA. Diagnostic reports are submitted to the student directly, unless the student requests otherwise. The SpLD

report must follow the report format as suggested by the SpLD working group. The content of each item in the following list has been specified in detail to ensure high quality, consistent and comprehensive report: cover sheet, summary, background information, test conditions, attainment of literacy (reading, writing and spelling), underlying ability, cognitive processing, other relevant information, statement of the assessor (signed) and appendix to attach list of tests used and summary of scores.

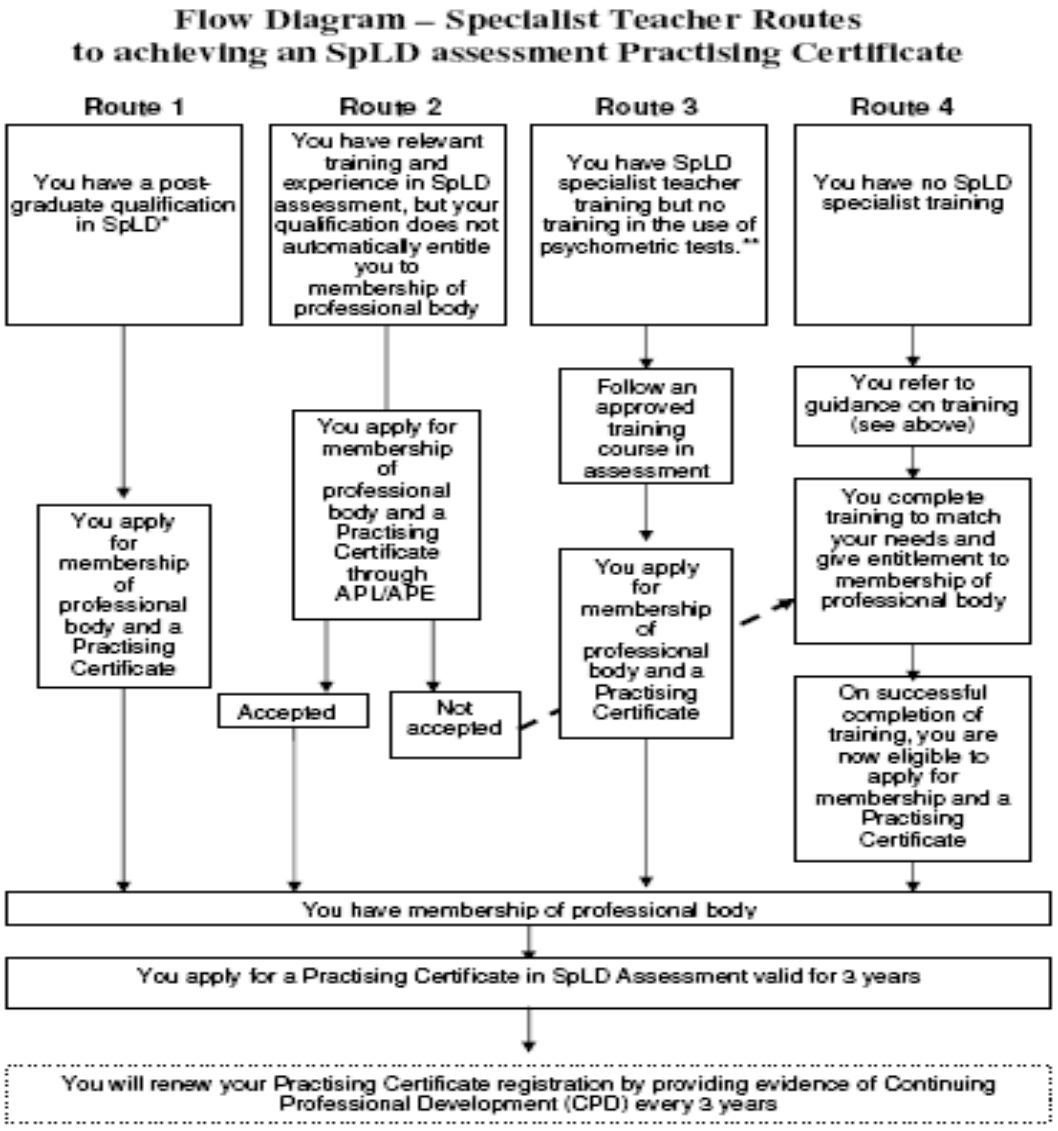
4.5 Assessment of students with English as an additional language (EAL)

A specific set of guidance notes on test administration and interpretation of the results is provided in this section as assessing EAL students, including Welsh students, is a challenge due to the lack of appropriate tests that consider the specific language and the culture of students being assessed. Therefore, when possible the assessment of EAL students is carried out by assessors with appropriate experience and knowledge in this area, and who are knowledgeable about the most current psychological and educational tests available for this group of students. Special consideration is paid to the specific linguistic and cultural features of the native language of the EAL student. Tests selected for administration carry appropriate norms and reflect the background of individuals being tested. When experienced assessors are not available, assessors administering the test are encouraged to seek advice from their experienced colleagues.

The exact number of dyslexic students in the UAE in unknown due to the absence of empirical studies on dyslexia in general in addition to the lack of a culturally-appropriate dyslexia assessment for Arabic speakers. This, together with the lack of adequate

resources for intervention and support and a policy statement for a disabled student allowance, prevents many students in UAE higher education from reaching their full potential and coping with the academic requirements of higher education. Poor performance eventually leads to multiple failure and eventually suspension from college or university.

Figure 4.1: Specialist Teacher Routes, Singleton (2005) to achieving an SpLD assessment Practicing Certificate.



*Post-graduate qualification with practical elements in teaching and assessment such as the OCR/RSA Diploma (SpLD), or equivalent qualification, e.g. qualifications meeting requirements for AMBDA (Associate Membership of the British Dyslexia Association) are suitable for this purpose.

**Qualification with practical elements in teaching such as the OCR/RSA Certificate (SpLD), or equivalent qualification. Qualifications meeting requirements for BDA ATS (Approved Teacher Status of the British Dyslexia Association) are suitable for this purpose.

CHAPTER 5

Methodology and Rationale for the Empirical Study

5.1 Introduction

As highlighted in the earlier chapters, the UAE is amongst the countries where developmental dyslexia remains the most poorly understood disability type. A lack of appropriate culture-specific diagnostic methods has had a detrimental effect on many young Emiratis in terms of education attainment, appropriate diagnosis and intervention, and employment opportunities. Inadequate knowledge and awareness by educators, the general public and dyslexics themselves of the nature of such disability has been the key problem. This is coupled with a lack of resources for appropriate support, and the absence of a clear statement of principles or guidelines for integrating students with dyslexia into the educational system. This leaves many dyslexic Emirati students victims of ridicule, leaving them to pass through the school system without acquiring the most basic academic skills. Thus, a comprehensive investigation needs to be carried out to identify appropriate assessment methods, interventions and support systems for dyslexic Emirati students.

As discussed previously, although Arabic is spoken by over 300 million people from twenty-two Arab countries, research studies on Arabic reading acquisition and literacy, as well as the challenges facing Arabic dyslexics, are thus far very rare. Very little research is available concerning Arabic reading processes from a cognitive and psycholinguistic perspective. The available studies currently concentrate on linguistic duality (Ayari 1996; Mansouri 1998; Abu-Rabia, 2000); the role of diacritics for beginning readers (Azzam,

1990); and the effects of vowels on reading accuracy in Arabic orthography (Abu-Rabia, 1998).

Therefore, the current study was designed to: a) Establish A-DAST norms for college level Emirati students, b) explore the manifestation of dyslexia in the Arabic language, c) develop a culturally-appropriate dyslexia assessment test for Emirati students; and d) identify a possible framework for intervention methods and support techniques that consider the context and the culture of Emirati students.

Following the findings and recommendations gathered from a previous study conducted in 2008 (Al Mazam, 2008) and in order to gain more accurate results on the level of students' attainment, passage reading was introduced to be used alongside one minute reading. Additionally, a 75-item questionnaire was designed with the objective of assessing dyslexic students' emotional and cognitive needs, as well as to establish grounds for appropriate intervention and support models for dyslexic students in the UAE.

Drawing on findings from a previous study I conducted in 2008, 'The Use of Dyslexia Adult Screening Test (DAST) in the United Arab Emirates (UAE)', it is suggested that approximately 5% of the HCT population exhibit characteristics of dyslexia, and phonological deficits are predictors of dyslexia in Arabic even though it is assumed that students on the whole overcome this weakness by adulthood. Cerebellar deficits are predictors of dyslexia in Arabic (Al Mazam, 2008). The reading of passages, which was introduced in the modified version of Arabic-DAST, is more sensitive in detecting dyslexia in Arabic and screening those with reading difficulties. Additionally, it is assumed that counselling services are not adequate and do not meet the needs of Emirati dyslexics.

Furthermore, it is thought that, with appropriate intervention and support, the academic performance of Emirati college students suffering from dyslexia will show some improvement.

5.2 Research Aim

The main aim of this study was to develop a culturally-appropriate framework for intervention to ensure adequate support for Emirati college students with dyslexia. The secondary aims of this study were: a) to devise a culturally-appropriate diagnostic assessment which would identify students who would benefit from such a programme, and b) to establish norms to identify characteristics of this group.

5.3 Research questions and Hypothesis

Research questions:

The current study is an assessment for dyslexia to inform subsequent support which was addressed through considering:

- Based on knowledge of the nature of Arabic orthography and recent developments in the field of developmental dyslexia, what sub-tests would constitute a suitable and culturally-appropriate diagnostic assessment for dyslexia for college level Emirati students?
- How does the nature of Arabic orthography affect the occurrence and manifestations of developmental dyslexia amongst Emirati college students? And do these specific orthographical features constitute an additional challenge for Emirati college students

in terms of second language acquisition (English being a second /additional language)?

- Do dyslexic students have specific counselling needs? And are these needs met?
- What are the effects of cognitive deficit on study skills, time management and academic performance of Emirati dyslexic students in higher education?
- What constitutes an appropriate framework for intervention and support for Emirati dyslexics in higher education?

The current study is based on the following hypotheses:

- Phonological deficits are envisaged to be a predictor of dyslexia in Arabic; therefore significant differences are expected be found between the scores of dyslexic and non-dyslexic Emirati students in the phonological deficit test.
- Significant statistical differences are expected to be found between the scores of dyslexic and non-dyslexic Emirati students on the reading of un-vowelized passages, the backward digit span, rapid naming, and spelling tests.
- No significant statistical differences are envisaged between the views of dyslexic and non-dyslexic on the adequacy of counselling services in the HCT.

A culturally-appropriate intervention and support programme will improve performance amongst Emirati dyslexic in higher education.

5.4 Ethical Considerations

Approval for this study was obtained from the Ethics Review Committee in line with procedures set out by the University of Sheffield, and in accordance with APA ethical guidelines. Approval to conduct this study in the Higher College of Technology was obtained from the Ministry of Higher Education in the UAE upon submission of the Research Proposal and the approval granted by the Ethics Review Committee at the University of Sheffield. At the time only one HCT College, Dubai Women's College, had an internal "Research Committee" and approval process through which appropriate approval was obtained as well after completing the application from and their ethics form. Permission to use college premises for conducting this research study was obtained electronically from the HCT and the relevant directorates. All relevant ethical issues were considered. In accordance with ethical guidelines at the University of Sheffield, the Ministry of Higher Education in the UAE and Dubai Women's College, informed consent was obtained from the colleges and the participants. The right to withdraw at any stage was made clear. To the best of the author's knowledge, this study did not cause harm to participants. However, the participants were informed that they could contact the researcher for appropriate advice and intervention, if deemed necessary.

5.5 Participants

Participants for the main study, the translation and adaptation of the DAST for the Arabic, referred to as A-DAST, were 280 first year college students from the Higher Colleges of Technology (HCT) in the UAE enrolled in the diploma foundation and higher diploma foundation programmes. The same group of participants also joined the second study by

completing the questionnaire aimed at assessing the counselling and support needs of Emirati dyslexics. From 280 participants, only those 13 students with characteristics of dyslexia were invited to participate in the third study, an intervention and support programme for Emirati dyslexic students.

Prior to selecting the participants for the study, the college registrar was contacted and briefed on the purpose of the study and the all the relevant approvals granted including the campus Director's approval. The registrar was requested to assist with the selection of the participants. She was given specific instructions to randomly select 280 first year students from an alphabetical list to take part in the study. As education is segregated, samples were representative of both male and female first year college students. The sample included 50% of each gender. The registrar selected every 10^{th} student registered in the first year of diploma and higher diploma foundations.

Two preliminary tests, a name agreement test and rapid naming, were administered to modify the Arabic-DAST and establish more accurate norms for Emirati students. Participants for these two tests were recruited from Dubai Women's College (DWC) as the researcher was an employee of DWC and had easier access to the participants and resources needed.

A total of fifty students from Diploma and Higher Diploma Foundations was randomly selected by the DWC registrar with equal representation of each group to participate in the name agreement study. There are a total of 10 sections of each Foundations programme with 25 students registered in each section; the DWC registrar selected every

second student from the alphabetical class roster from sections 1 through 5 of Diploma and Higher Diploma Foundations. A total of 10 participants were selected from each section.

As for the rapid naming test, 150 participants were also randomly selected by the DWC registrar with equal representations from Diploma Foundation, Higher Diploma Foundation and first year students from Bachelors (BSc) programmes (Business, Education, Applied Communication, Information Technology and Health Sciences). The DWC registrar selected every second student from the alphabetical class roster of sections 6 through 10 of Diploma and Higher Diploma Foundations as well as students from each of the BSc programmes. To ensure reliability of the results obtained, those who participated in the two preliminary studies were not considered for the main test. To ensure validity of the results, they were compared with the A-DAST scores administered in 2008 as a part of an MSc project.

Full support was received from the Ministry of the Higher Education and Scientific Research by providing scholarship and fully funding this project. The Dubai Colleges supported the implementation of this study. The support offered from the Dubai colleges was in terms of allowing access to the participants; resources such as a dedicated classroom with whiteboard and a projector for administering the three studies, office space with landline, computer and a printer; stationary was also offered free of charge.

Two relatively easy situations were encountered during participants' selection where they were effortlessly resolved. The first situation was when the system registrar at that time voiced some objections towards accommodation for students with learning disabilities. However; she soon offered her full support and cooperation when the objective of the study

was reiterated and examples of the LD accommodations and support programmes from some leading universities were shared with her.

The second situation was when one of the parents voiced a concern about her daughter's participation in the study, yet once the objective and the purpose of the study was clarified, the scope of the participation was explained and the right to withdraw at any point during the study was reiterated, the mother approved her daughter's participation in the study. The same parent later on referred another parent to seek information on developmental dyslexia, who requested the Arabic DAST should be administered on her daughter. This was a first year college student who was not taking part in the study but who, according to the mother, had always faced difficulties with academic and non-academic skills.

5.6 Experimental Procedure

5.6.1 Dyslexia Adult Screening Test (DAST)

The purpose of the current study was to develop a framework for culturally-appropriate support and intervention rather than assessment of dyslexia. The lack of such instruments in the UAE or the Arab countries led to the exploration of the most suitable tools available in languages other than Arabic such as English. Various dyslexia assessment units were visited at Sheffield University, University of Hull, and Kuwait Dyslexia Association, and numerous tests were examined, some of which were in forms of check lists and questionnaires (Kirk, 1998; Kirk & Reid, 1999), computerized screening "Scan Study" (Zdzienski, 1997) and the Cognitive Profiling System (CoPS: Singleton et al., 1996/97), the Wide Range Achievement Test (WART-3), and the Dyslexia Adult Screening Test (DAST).

Through this exploration exercise it was apparent that most dyslexia assessments adopt a multi-level assessment approach (Torgeston 1989, Turner 1997, Turner & Nicholas 2000, Thomson 2000, & Doyle 2002) which includes the following three levels of assessment: a) abilities, b) attainment and c) core indicators of dyslexia, with the aim to provide profiling of individuals' strengths, weakness, and learning style (Miles 1999, Farmer et al 2002). Abilities are usually assessed through administering a mental abilities test. Individual's overall IQ (overall intellectual ability) is noted based on the arithmetic average of their score on several tests of ability. To date there are some researchers who still regard IQ as indispensable when it comes to identifying dyslexia. According to Turner (1997) IQ is the "first port of call" (Turner, 1997:39) and it is the most important predictor of academic achievement (Turner, 2000). Discussions with regard to the IQ were presented in the second chapter of this study (Siegel, 1989; Stanovich, 1991; Turner, 2000; Reid & Kirk, 2001). A number of assessment batteries use various mental abilities test, or specific components of a well-known IQ test. The British Abilities Scale and Wechsler Adult Intelligence Scale are examples of these tests.

Attainment is the second level of dyslexia assessment. The subtests/tasks under this section attempt to assess individuals' current attainment level. For example, their academic achievement and educational level is noted. Empirical research on dyslexia greatly focused attention on the skills of reading, writing and spelling and found these to be closely related to dyslexia. Therefore, reading, writing and spelling are significant components of dyslexia battery tests. Reading skills include accuracy, comprehension, and fluency, depending on the skill which is being measured and the type of language used when administering dyslexia assessment. For example, when administering a dyslexia assessment in Arabic, reading

comprehension makes a better predictor of dyslexia than reading fluency due to the nature of the Arabic language, as described in the third chapter. Both reading and spelling tasks are significant elements of dyslexia assessment and very relevant is explaining dyslexia manifestations in different languages.

While the attainment tests provide information on whether the individual continues to struggle with reading, writing and spelling, it does not clarify why. Therefore, the third level of assessment examines the core indicators of dyslexia; identifies patterns of difficulties; and covers a range of skills known to be affected in dyslexia. Then the profile of difficulties is used to interpret the causes of attainment challenges and provide an index of which skills require support. These core indicators include cognitive deficits (verbal short-term memory, poor ability to recall backwards digits tasks, slow speed of processing and low access to orthographic cues), and phonological deficits (poor ability to name familiar stimuli, poor ability to read non-words, and poor rhyming skills).

The type of language used in dyslexia assessment plays a key role in determining suitable tasks and subtests in the multi-level assessment battery. For instance, German and Italian dyslexics tend to perform better on phonological awareness tasks than English dyslexics (Landerl, 2003). This is due to consistent phoneme-grapheme relationships and the transparent nature of the German and Italian languages. Spelling is generally considered a marker for dyslexia across languages (Goulandris & Snowling, 2003).

The Dyslexia Adult Screening Test (Fawcett and Nicolson, 1997) was selected as the primary assessment tool for the purpose of this study as it adopts a multi-level assessment approach. The DAST was translated into Arabic and modified to ensure it is culturally-

appropriate. The DAST serves the purpose of this research study as it accounts for the most recent research in developmental dyslexia and the role of the cerebellum in relation to dyslexia and phonological processing (Reid & Kirk, 2001), and it provides a profile of weaknesses and strengths which in turn informs an appropriate intervention and training approach. This is specifically important for the purpose of the study, as the main aim is to provide assessment for support. Additionally, as the screening takes approximately 30 minutes, it provides a quick and inexpensive way of discovering whether a comprehensive assessment is required or not. As highlighted in the first and the third chapters, dyslexia diagnostic assessments for adult Arabic speakers is non-existent, therefore it is was essential to choose a tool such as DAST which yields a substantial amount of data, can help identify appropriate intervention and accommodation, and could be used for diagnostic assessment. The DAST includes normative data on a sample of over 1000 adults in British schools which facilitates a fair comparison between Emirati and British cohorts on the subtests.

The Dyslexia Adult Screening Test (DAST) was developed in 1997 by Professor Rod Nicolson and Dr Angela Fawcett, authors of the established Dyslexia Screening Test (DST) and Dyslexia Early Screening Test (DEST). The DAST was developed to assess dyslexia in adults (Nicolson & Fawcett, 1998). It was adapted from the 1996 Dyslexia Screening Test (DST) which was designed to be administered by school professionals. The battery of tests consists of 11 sub-tests with 9 based on deficits in an array of skills that dyslexics are known to exhibit, such as phonological awareness, auditory memory, and motor coordination. These include measures of literacy (reading, writing and spelling), phonological skills, naming speed, balance and verbal fluency. Additionally, semantic fluency and nonverbal reasoning subtests are aimed to identify areas of strength amongst dyslexic individuals. DAST is

administered individually in approximately 30 minutes. Reliability and validity have been established in both dyslexic adults and student samples (Nicolson and Fawcett, 1997).

The scoring of DAST uses the At Risk Quotient (AQR). The scores achieved by the participants on each of the eleven subtests are converted to visual codes relevant to age. For example, a triple minus (---) indicates that the participant scored 3 standard deviations below the mean of the specific subtest, and that is identical to a z-score of -3 or even lower. The summative scores on each sub-test aggregate to form an ability profile which contributes towards an overall 'at risk' index. An AQR of 1 implies that the individual is highly at risk of dyslexia, whilst an AQR of 0.7 implies a mild risk of dyslexia.

5.6.2 Modifications of Arabic DAST (A-DAST)

The DAST was initially translated into Arabic in 2008 by the researcher as part of a study named 'Use of Dyslexia Adult Screening Test (DAST) in the UAE'. A multi-step procedure was used for test translation, which follows guidance adopted from Barcken & Barona (1991) to ensure valid and reliable translation:

- **Source to target translation**: DAST was translated from English to Arabic by the researcher who is bilingual and familiar with the underlying concepts.
- **Blind back-translation**: DAST was translated back to English by another bilingual individual with no prior knowledge of the test and its content.
- **Translation-back-translation**: Translation was repeated twice until no further errors were found.

- **A Bilingual Review Committee**: Consisting of an Arabic teacher and individuals from the Ministry of Education working in the Special Needs Department, they examined the translated text to ensure that region-specific words were included.
- **Pilot testing**: The DAST was conducted with volunteers from government schools to ensure that the vocabulary and phrases used would elicit appropriate responses.
- **Field testing**: This was carried out as a final attempt to identify inaccuracies and ensure adequacy and appropriateness of the words and phrases used.

Following the findings and recommendations from this study Arabic-DAST, further modifications were applied to A-DAST: Two preliminary studies were introduced, the Name Agreement Test was administered and the Rapid Naming sub-test was re-administered to allow for a more precise conclusion with regard to association of naming speed with dyslexia in Arabic (discussed in detail under study 1). Additionally, Passage Reading was introduced to be used alongside the One Minute Reading test to allow for more precise results on reading skills in Arabic.

5.6.3 A-DAST Subtests (Arabic DAST - Appendix E)

Table 5.1: A-DAST (Arabic Dyslexia Adult Screening Test)

No	A-DAST Sub-tests	No	A-DAST Sub-tests	No	A-DAST Sub-tests
1	Rapid Naming (RN)	5	Two Minute Spelling (2MS)	9	One Minute Writing (1MW)
2	One Minute Reading (1MR)	6	Backwards Digit Span (BS)	10	Verbal Fluency (VF)
3	Postural Stability (PS)	7	Nonsense Passage Reading (NPR)	11	Semantic Fluency (SF)
4	Phonemic Segmentation (PSeg)	8	Nonverbal Reasoning (NVR)	12	Passage Reading (PR)

5.6.3.1 Rapid Naming (RN)

Rapid Naming measures the speed of naming a number of visual stimuli in one minute. This task consists of an A4 sheet portraying a total of 20 objects, each one appearing twice. The objects are presented in eight rows, with each row containing five objects. The participants are asked to name the objects as fast as they can in one minute. Time is recorded in seconds, and five seconds are added for each error. As Arabic is read from right to left, the naming order of the objects was shifted. They were asked to start from the top right and go all the way to the bottom of the page (while pointing to the first one and tracing to the last object).

5.6.3.2 One Minute Reading

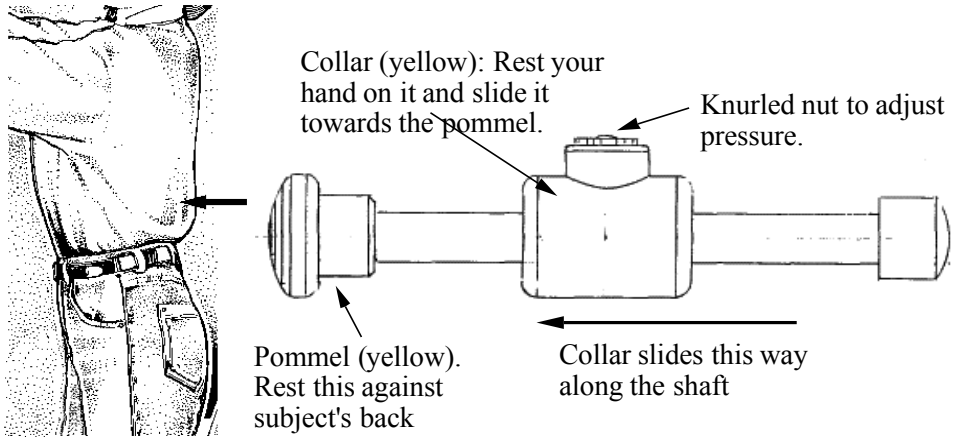
One Minute Reading consists of a list of single words intended to measure both speed and accuracy of reading skills. The participants are asked to read out loud as many words as they

can in one minute. One point is given for every word read correctly within a minute. This test was adapted with Arabic words.

5.6.3.3 Postural Stability

This test assesses sense of balance. This is achieved by using a device called a 'balance tester', a plastic tool with a yellow collar which slides on a clear internal shaft, with a felt washer to control the friction. The tester stands behind the participant holding the balance tester horizontally, placing the pommel on the vertebrae of the participant's back. A sufficient force results in the collar sliding, thus controlling the force. Participants wear a blindfold and stand up with their feet together and hands by their sides. The participants are asked to stay as still a possible when they feel a push in their backs by the balance tester. This is repeated on two other occasions with the participants' arms straight out in front. The test is scored as follows: 0 for rock solid, 1 for slight sway, 2 for rise of toes, 3 for small forward step, 4 for a clear forward step, 5 for two controlled steps forward and 6 for quite a few steps or a clear loss of balance.

Figure 5.1: Administration of Postural Stability Subtest.



5.6.3.4 Phonemic Segmentation

This test measures the ability to divide words accurately into their constituent sounds, and manipulate those sounds by deleting syllables or consonants, such as "say breakfast without /brek/". The Spoonerisms Test is an additional task to test adult phonological skills; in this section participants are asked to exchange the sounds in two words, for instance for 'Car Park' say 'Par Cark' and so on. This test is scored by adding the total number correct in the main and Spoonerism tests. A penalty of 1 point is applied for time taken in excess of 50 seconds.

5.6.3.5 Two Minute Spelling

This test assesses the ability to spell correctly as many words as possible in two minutes. It consists of a list of words which are dictated to the participant one at a time. The next word is dictated as the participant finishes writing the previous one. The test is discontinued if the participants make five consecutive errors or if they show any sign of distress. If the participants make two or more errors in the first line, they are given eight easy words available on an additional list, and then return to the second line of the main test. Participants receive one point for every word spelled correctly and 8 points are added to the total if they did not require the additional easy words. The number of errors, handwriting quality and which hand was used are also noted.

5.6.3.6 Backwards Digit Span

The Digit Span is a standard element of an IQ test. It assesses how many digits the participants can remember in the correct order. Backwards Digit Span is more challenging and requires the participants to use their working memory to recall the digits in a backwards

manner. Participants start with two digits and may go up to eight digits if they have successfully completed all the previous ones. There are two trials for each set of digits. The test is discontinued after two errors at any length. The score is the total number of correct digit recalls.

5.6.3.7 Nonsense Passage Reading

This test involves reading unfamiliar words. A nonsense passage is created by mixing real words with fifteen non-words. This test measures orthographic analysis skills which involves splitting down the written words into pieces that can be articulated. Participants are allowed three minutes to read them. They are given one point for each of the 59 real words read correctly, two points for each of the fifteen nonsense words read correctly and one point is given for a close try of any of the fifteen nonsense words. One extra point for every two seconds is added for completion under one minute if at least eleven out fifteen nonsense words are read correctly. One point is subtracted for every extra two seconds taken over one minute.

5.6.3.8 Nonverbal Reasoning

This test involves reasoning through a set of eight questions which consist of sequencing, analogies, similarities and differences. Results of this task provide a rough measure of fluid intelligence. Participants are expected to complete the task in four minutes and one point is given for each correct answer.

5.6.3.9 One Minute Writing

This test measures the speed and accuracy of writing or copying a short text passage when thinking is not required. Participants are given a short passage of five lines with ten words on each line, and asked to copy it as fast as they can in one minute. One point is given for every correct word, one extra point is given if completion time is less than 1 minute, one point is taken away for every two errors, three points are taken away for poor handwriting, and two points are taken away for poor punctuation.

5.6.3.10 Verbal Fluency

This test involves naming as many words starting with 'S' as possible in one minute. One point is given for each valid and non-repeated word; appropriate names are accepted in this test too.

5.6.3.11 Semantic Fluency

This test involves naming as many animals as possible in one minute. One point is given for each valid and non-repeated animal name.

5.6.3.12 Passage Readings

Passage reading was introduced to be used alongside the 'one minute reading' test in the Arabic-DAST, to measure accurately the level of attainment in reading tasks in Arabic. Given that it totally depends on context, single word reading alone will not be an accurate indicator of performance in the reading task.

It was suggested by Arabic Language researchers that to assess the level of reading attainment in Arabic accurately it is essential to assess the ability to read an age appropriate text at a lower level. That is due to the complexity of Arabic text, the dual function of consonants, and absence and presence of diacritic marks. Therefore eight passages from Saudi text books were selected. Four passages for grade twelve and four passages for university level were selected, mainly to ensure that the participants had not been exposed to these passages in their schools. These passages were then passed on to College instructors and Arabic teachers in secondary schools for feedback. The reading passages were finalized and selected. One passage was selected for each level. The length of the passages and diacritic 'vowels' were considered during the selection process. Comprehension, speed and accuracy are measured. The final score was the number of words read correctly.

Reading Passage 1

Appropriate for grade twelve students, this consisted of 250 words. 50 words with diacritics were available, and 25 out of 50 words with diacritics were presented again in other places in the passage without the diacritics. One point is given for every word read correctly

Reading Passage 2

This passage was appropriate for first year college students, and consisted of 250 words with the absence of diacritics. One point is given for every word read correctly.

The following section consists of two parts. Part 1: preliminary studies a) Name Agreement sub-test and b) Rapid Naming sub-test. Part 2: three main studies a) Counselling and support needs of Emirati dyslexics, b) A-DAST Administration, Emirati norms and identification of Emirati dyslexic students and c) Intervention and support programme for

Emirati dyslexics. To ensure clarity of each test, the methodology is presented in the above order and in a separate section.

CHAPTER 6

Study 1: Translation and Adaptation of the Dyslexia Adult Screening Test for the Arabic Language (A-DAST)

6.1 Introduction

This section describes the process involved in achieving further modification of A-DAST tests from English to Arabic and adaptation of several components of the screening test according to the different cultural and linguistic features of the Arabic language. This was accomplished through administration of two preliminary tests as highlighted below. The complete A-DAST was then administered to a set of 280 students in Higher Colleges of Technology (HCT) to identify norms for the Arabic speaking students enrolled in the Higher Education. This study resulted in appropriate norms being derived and compared with DAST norms for UK populations.

6.2 Preliminary Studies

Prior to the administration of the three main studies, as clear in the figure 6.1 two preliminary studies, namely a name agreement test and rapid naming tests, were conducted, to further modify A-DAST and ensure a fair, reliable and culturally-appropriate assessment for the needs of Emirati students with dyslexia. Below is a detailed account of the two preliminary studies.

6.2.1 Preliminary study 1: Name agreement test

As highlighted by most of the researchers, dyslexic individuals tend to perform poorly on tasks which involve naming pictures or colours (Denckla and Rudel, 1976). The Rapid Naming test is one of the thirteen subtests in the modified Arabic-DAST; it measures the time taken to name a full A4 page of pictures. This test was adopted by the founders of the DAST, Fawcett and Nicolson, from 'Rapid Automatized Naming' which was highlighted in the 1970s by Denckla as a sign of dyslexia.

In a previous study conducted in 2008, Emirati students' performance on the Rapid Naming Task (mean = 34.69) was lower than the English cohort (mean = 25.57) indicating that UAE students took longer to name the same number of objects (Al Mazam, 2008). To verify the reasons for this poor performance, the Name Agreement Test was conducted with students from Dubai Women's College (DWC).

6.2.1.1 Experimental Procedure

A list of all possible object names was prepared before the test, with an additional column to add any other names suggested by the participants. All the participants were asked to name the objects on the A4 sheet as fast as they could. As Arabic is read from right to left, the reading order of the objects was altered. As previously stated, they were asked to start from the top right and go all the way to the bottom of the page (tracing from the first to the last object). The terminology used by the participants to name an object was highlighted on the sheet. Names that were not on the original sheet but were suggested by participants were then added in the column available.

6.2.1.2 Participants

Fifty students from Year 1 of the Diploma Foundation and Higher Diploma foundation at Dubai Women's College (DWC) participated in the name agreement test as specified in Chapter Five under section 5.5. Each student was tested individually and was asked not to discuss the test with her peers. Percentages were then calculated to find out the most common name for each of the objects. These names were subsequently used on the Rapid Naming main task.

6.2.1.3 Results

Participants frequently used different terminologies for all the objects, with more than one accurate name. Some of the participants also used terminologies from the local Emirati dialect, such as '*far'* for mouse, '*qatwa'* for cat, '*werga'* for leaf, '*kaika',* for cake and '*qah'feya'* for hat. Some of these were very frequent, as highlighted in Table 6.1 below. As a result of this test, terminologies with a higher frequency were selected to be used in the Rapid Naming Task to determine whether or not that would have any impact on the speed in this task.

6.2.1.4 Analysis

Findings from this preliminary test highlight the importance of culturally-appropriate assessment for diagnosing dyslexia in Arabic. Additionally it may be an indication that the delay in naming speed in the Rapid Naming subtest could have been due to a delay in the process of trying to remember which terminology was used by the tester during subtest practice.

Table 6.1: Name agreement test percentages (%)

No	English Names	Arabic Names %	Arabic Names %	Arabic Names %	Arabic Names %	Total %
1	Boat	**Safeena** **62%**	Bakhera 38%			100
2	Bird	Tair 44%	**Asfoor** **46%**	Asfoora 4%	Hamama 6%	100
3	Mouse	**Far** **62%**	Fa'r 24%	Jerth 14%		100
4	Cat	**Qetta** **68%**	Herra 26%	Qatwa 6%		100
5	Leaf	**Waraqa** **70%**	Werga 24%	Waraqat shajar 6%		100
6	Girl	Bent 14%	Domya 8%	**Aroosa** **68%**	lo'ba 10%	100
7	Dog	**Kalb** **78%**	Kalba 14%	Jaro 8%		100
8	Cake	**Ka'ka** **52%**	Kaik 26%	Kaika 22%		100
9	Horse	Hesan 32%	Faras 10%	**Khail** **58%**		100
10	Hat	**Qah'feya** **46%**	Taqeya 36%	Kaboos 16%	Kab 2%	100

6.2.2 Preliminary Study 2: Rapid Naming Test

6.2.2.1 Experimental Procedure

The Rapid Naming test was updated using the results obtained from the Name Agreement test. The tester then named the objects on the first half of the sheet one by one while pointing to each one in turn from right to left. They started by naming the objects from the top right, and went all the way to the bottom of the first half of the page while pointing to each object in turn. Participants were then asked to perform the task. They were then shown the order of naming the objects by pointing to them. Each student was tested individually. The duration of the practice and the main test was 3 minutes.

For the main test, the participants were asked to name the objects from the A4 sheet as fast as they could from right to left. They were asked to start from the top right and go all the way to the bottom of the page (while tracing from the first to the last object). Time was recorded in seconds. It was noted whether the participants confirmed the names used by the tester or if they became stuck at any point.

6.2.2.2 Participants

150 students from DWC participated in the Rapid Naming Test. These were first year students from the Diploma Foundation, Higher Diploma Foundation programmes as specified in Chapter Five under section 5.5.

6.2.2.3 Results

Scores in the Table 6.2 show that Emirati students' performance on the rapid naming task has improved (mean = 20.96). Effect size was calculated to find the magnitude of the

observed effect. It was obtained by calculating the difference between UAE means and DAST means from the manual divided by DAST standard deviation. An effect size of -.66 revealed a medium sized effect with rapid naming indicating a better performance of Emirati students on the task. Therefore, the results of this study suggest that poor performance of Emirati students on rapid naming in the previous study was due to the decision-making process for selecting the most appropriate terminology for objects which had more than one accurate name.

Table 6.2: Rapid Naming Scores

N	MIN	MAX	MEAN	STDV	ESM
150	17	26	20.96	2.36	-0.66

6.2.2.4 Discussion

These two preliminary studies resulted in further modification of A-DAST to ensure its suitability as a culturally-appropriate diagnostic assessment for Emirati students.

The performance of Emirati students improved dramatically on the rapid naming subtest following the adaptation. The rapid naming test measures the time taken to name a series of visual stimuli (speed). This improvement was apparent following modifications to the Arabic-DAST. Emirati college students scored a mean of 20.96 in the second preliminary study on the rapid naming test, which is more consistent with the findings from DAST UK (mean = 21.01); whereas the previous cohort tested in 2008 scored a mean of 34.69. This consistency in the scores on rapid naming in UAE and UK cohorts supports that measures of

speed could be a diagnostic indicator of 'at risk' readers and dyslexia in Arabic. This is supported by the arguments that dyslexia is not language independent (Smythe et al., 2004), and that language amongst other environmental factors is in constant interplay with cognitive, biological and behavioural levels (Frith, 1997). These findings also converge with the conclusion of McBride-Chung and Manis, 1996; Mutter, 2003; and Davis et al., 2001, that rapid naming is significantly associated with word reading.

Therefore, it could be argued that the reason for the delay found in the previous study was due to the use of object names unfamiliar to the Emirati students and not due to multiple object names or more syllables for female object names. Thus it can be concluded that such high improvement on the rapid naming task by the Emirati students is due to having a more 'automatic' access to the culture-specific words such as '*khail'* for horse and '*qah'feya'* for hat.

6.3 A-DAST Emirati norms and identification of Emirati dyslexic students

6.3.1 A-DAST and Passage Reading Administration

The modified Arabic DAST with eleven subtests and two passage readings was administered to the 280 HCT students during the first and second week of April, 2009.

Study Stages

First Stage:

Due to the nature of the test setting and the number of participants involved, ten test administrators from the psychology department in the Ministry of Education were recruited to assist the researcher with test administration and reach the target during the Easter break.

All ten administrators had participated in administering the Arabic-DAST the previous year. A five-hour refresher training session was conducted to ensure an understanding of the objectives of the study and to master the administration of the battery test. Administrators were also trained on administering the two reading passages and alerted to the modifications in the Rapid Naming Test.

Second Stage:

A test trial run was organized to further ensure efficiency and accuracy of the test administration and scoring. Fifty volunteers were recruited from DWC to act as participants in the trial session. Each administrator tested and scored five volunteers using the Arabic-DAST, under the researcher's supervision.

Third Stage:

A-DAST was administered with 280 first year college students from the HCT. Each administrator was assigned 28 participants. Participants were tested individually and background information on participants was collected to update the information provided previously during the questionnaire administration. Each session was 45 minutes long. Participants completed thirteen A-DAST subtests related to attainment and diagnostic parameters. These included rapid naming (RN), one minute reading (1MR), postural stability (PS), phonemic segmentation (PSeg), two minute spelling (2MS), backwards digit span (BS), nonsense passage reading (NPR), non-verbal reasoning (NVR), one minute writing (1MW), verbal fluency (VF) and semantic fluency (SF), reading passage 1 (RP1) and reading passage 2 (RP2).

To maintain confidentiality, all the test components and scoring forms were coded. Data collection was completed over a two week period. The overall results of the study were shared with the Ministry of Higher Education, the HCT accordingly. Information on individual student performance was not disclosed to the HCT. At-risk students were contacted in September, 2009 and given a report of their case.

6.3.1.1 A-DAST and Passages Reading Analysis

Descriptive statistics and factor analysis were used to analyse data obtained from the Arabic-DAST and the two reading passages.

6.3.1.2 Descriptive Statistics

Using descriptive statistics, Arabic-DAST norms for each subtest for Emirati college students were derived. Table 6.3 shows these norms. The means and standard deviations were calculated for this cohort and these were used to develop standardized scores with a mean (m) of 100 and standard deviation (SD) of 15.

Table 6.3: DAST means (English), A-DAST 08 and A-DAST 09 means (Arabic-DAST Norms)

	RN	1MR	PSt	PSeg	2MS	BS	NPR	NVR	1MW	VF	SF	RP1	RP2
UAE 08 mean	34.69	156.80	0.27	13.95	36.64	13.28	86.18	7.22	36.11	20.88	24.12	NA	NA
UAE 09 mean	**21.01**	**157.80**	**0.16**	13.68	36.10	**13.3**	**85.62**	**7.13**	35.48	**20.27**	**23.99**	240.4	436.5
DAST mean	25.57	112.23	1.91	13.59	35.14	7.59	90.89	5.58	35.80	17.99	20.49	NA	NA
UAE 08 sd	4.66	19.73	0.58	1.15	3.37	1.23	7.02	0.95	4.28	2.63	4.71	NA	NA
UAE 09 sd	6.08	23.31	0.77	1.51	4.45	1.35	7.54	0.96	5.05	3.42	4.69	15.31	55.19
DAST sd	6.97	19.13	3.34	1.76	5.78	2.64	10.28	1.48	5.67	4.65	5.96	NA	NA

The above table 6.3 shows that the results obtained from the Arabic-DAST 09 are consistent with those obtained in the first study in 2008 on almost all the subtests. However, there are a few variations which were expected, given that the sample is older in age and academic level, and in addition the sample consists of bilingual subjects as more representative of the UAE population. Therefore, Emirati students' performance of RN (mean = 21.01) was better than that of the English cohort (mean = 25.57). In addition, Emirati students showed better performance on 1 minute reading (mean = 157.80), postural stability (mean = 0.16), backwards digit span (mean = 13.3), nonverbal reasoning (mean = 7.13), verbal fluency (mean = 20.27) and semantic fluency (mean = 23.99). Both Emirati and English students showed a similar performance pattern on the phonemic segmentation task

(UAE 08 mean = 13.95, UAE 09 mean = 13.68 and DAST mean = 13.59). However, Emirati students showed weakness in nonsense passage reading (mean = 85.62).

Table 6.4: Percentage of At-Risk students (Arabic-DAST & Reading Passages 09) N= 280.

Score <=90 on >= 7subtests	Literacy Attainment Tasks	Phonological Tasks	Literacy & Phonological Tasks
4.60%	6.1%	5.7%	5.7%

Participants who scored 90 or less on the A-DAST subtests were identified as poor performers. Table 6.4 illustrates that a total of 4.6% of the participants exhibited dyslexic characteristics, as they performed poorly on seven or more subtests of the Arabic-DAST and reading passages. Furthermore, 6.1% of the participants performed poorly on attainment tasks (1MR, 2MS, 1MW, RP1 RP2), out of which 5.7% showed difficulties in both literacy and phonological tasks.

6.3.1.3 Factor Analysis

Factor analysis was employed to investigate the clustering of variables that were considered to be significant components in terms of manifestations of dyslexia in the Arabic language. Table 6.6 shows the 'Correlation Matrix'. Inspection of the matrix reveals the presence of many coefficients above 0.3. It is clear that all the variables correlate with each other fairly well and multicollinearity is not a problem for this data set, therefore none of the subtests was eliminated at this stage.

In the Table 6.5, the KMO measure of sampling adequacy yields a value of .895, indicating that patterns of correlations are relatively compact and so factor analysis is appropriate for this data set and should yield distinct and reliable factors. In addition, Bartlett's Test of Sphericity is highly significant (p <. 001), therefore, confirming the suitability of factor analysis.

Table 6.5: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.895**
Bartlett's Test of Sphericity	Approx. Chi-Square	1278.487
	Df	78
	Sig.	**.000**

Table 6.6: Correlation Matrix

Correlation Matrix

		Rapid Naming (RN)	One Minute Reading (1MR)	Postural Stability (PS)	Phonemic Segmentation (P Seg)	Two Minutes Spelling (2MS)	Backwards Digit Span (BS)	Nonsense Passage Reading (NPR)	Non-Verbal Reasoning (NVR)	One Minute Writing (1MW)	Verbal Fluency (VF)	Semantic Fluency (SF)	Reading Passage 1 (RP1)	Reading Passage 2 (RP2)
Correlation	Rapid Naming (RN)	1.000	-.461	.347	-.453	-.446	-.437	-.254	-.344	-.385	-.481	-.191	-.555	-.421
	One Minute Reading (1MR)	-.461	1.000	-.402	.327	.403	.227	.184	.195	.348	.405	.284	.627	.539
	Postural Stability (PS)	.347	-.402	1.000	-.250	-.500	-.306	-.354	-.309	-.469	-.450	-.348	-.434	-.381
	Phonemic Segmentatio (P Seg)	-.453	.327	-.250	1.000	.362	.305	.194	.205	.364	.410	.185	.415	.342
	Two Minutes Spelling (2MS)	-.446	.403	-.500	.362	1.000	.307	.343	.273	.432	.508	.241	.459	.340
	Backwards Digit Span (BS)	-.437	.227	-.306	.305	.307	1.000	.137	.159	.292	.354	.179	.299	.265
	Nonsense Passage Reading (NPR)	-.254	.184	-.354	.194	.343	.137	1.000	.377	.216	.298	.206	.265	.146
	Non-Verbal Reasoning (NVR)	-.344	.195	-.309	.205	.273	.159	.377	1.000	.251	.289	.097	.197	.134
	One Minute Writing (1M	-.385	.348	-.469	.364	.432	.292	.216	.251	1.000	.450	.232	.484	.437
	Verbal Fluency (VF)	-.481	.405	-.450	.410	.508	.354	.298	.289	.450	1.000	.355	.484	.377
	Semantic Fluency (SF)	-.191	.284	-.348	.185	.241	.179	.206	.097	.232	.355	1.000	.265	.176
	Reading Passage 1 (RP1)	-.555	.627	-.434	.415	.459	.299	.265	.197	.484	.484	.265	1.000	.729
	Reading Passage 2 (RP2)	-.421	.539	-.381	.342	.340	.265	.146	.134	.437	.377	.176	.729	1.000

Table 6.7 of communalities below shows that all the communalities were greater than 0.3, indicating reliability in each of the items. Semantic Fluency (.206) was the variable that could be least explained by these factors, however it was decided that it would not be removed.

Table 6.7: Communalities

	Initial	Extraction
Rapid Naming (RN)	1.000	.524
One Minute Reading (1MR)	1.000	.564
Postural Stability (PS)	1.000	.515
Phonemic Segmentation (P Seg)	1.000	.360
Two Minutes Spelling (2MS)	1.000	.518
Backwards Digit Span (BS)	1.000	.262
Nonsense Passage Reading (NPR)	1.000	.570
Non-Verbal Reasoning (NVR)	1.000	.520
One Minute Writing (1MW)	1.000	.450
Verbal Fluency (VF)	1.000	.542
Semantic Fluency (SF)	1.000	.206
Reading Passage 1 (RP1)	1.000	.751
Reading Passage 2 (RP2)	1.000	.682

Extraction Method: Principal Component Analysis.

6.3.1.4 Factor Extraction

According to Kaiser's criterion, only factors with eigenvalues greater than 1 were extracted using principal component analysis. In this case two components were extracted.

These components had eigenvalues of 5.207 and 1.257 as clear in Table 6.7. Before rotation, Factor 1 accounted for considerably more variance than Factor 2 (40.053% compared to 9.668%); however, these two components explain a total of 49.72% of the variance (see the Table 6.8 below).

Table 6.8: Total Variance Explained

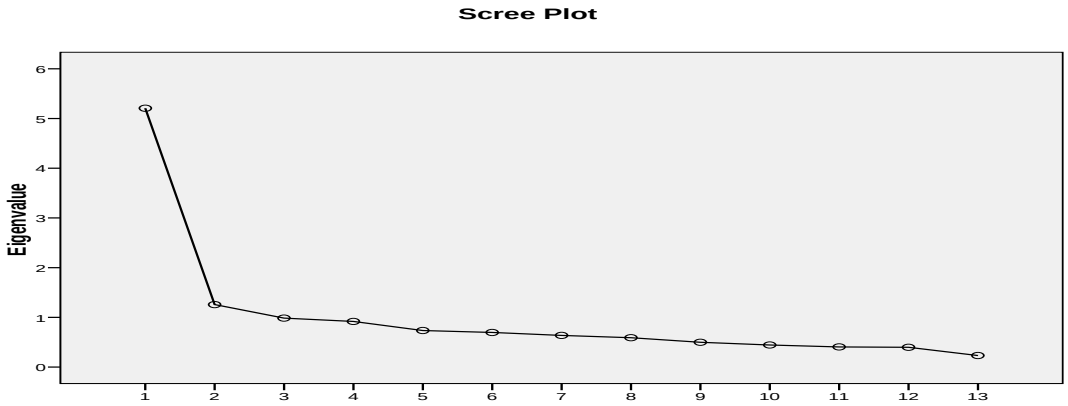
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings(a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.207	40.053	40.053	5.207	40.053	40.053	4.942
2	1.257	9.668	49.721	1.257	9.668	49.721	2.754
3	.985	7.573	57.294				
4	.918	7.058	64.353				
5	.735	5.652	70.005				
6	.696	5.352	75.357				
7	.636	4.895	80.252				
8	.590	4.541	84.793				
9	.498	3.834	88.627				
10	.444	3.415	92.043				
11	.405	3.117	95.160				
12	.397	3.056	98.216				
13	.232	1.784	100.000				

Extraction Method: Principal Component Analysis.

a When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

The Scree Plot in Figure 6.2 reveals a clear break (or elbow) after the first two components. Using Catell's (1966) scree test, retaining these two components for additional exploration was deemed necessary. Therefore, components 1 and 2 are retained.

Figure 6.1: Scree Plot (Eigenvalues)



Reviewing the loadings in the Component Matrix Table 6.9, it is clear that most of the items load strongly on the two components. Thus is can be concluded that a two-factor solution is probably more appropriate.

Table 6.9: Component Matrix(a)

	Component	
	1	2
Reading Passage 1 (RP1)	.793	-.348
Verbal Fluency (VF)	.729	
Rapid Naming (RN)	-.722	
Two Minutes Spelling (2MS)	.700	
One Minute Reading (1MR)	.685	-.308
Postural Stability (PS)	-.682	
Reading Passage 2 (RP2)	.679	-.471
One Minute Writing (1MW)	.670	
Phonemic Segmentation (P Seg)	.592	
Backwards Digit Span (BS)	.512	
Semantic Fluency (SF)	.432	
Nonsense Passage Reading (NPR)	.451	.606
Non-Verbal Reasoning (NVR)	.434	.576

Extraction Method: Principal Component Analysis. a 2 components extracted.

6.3.1.5 Factor rotation

The two components solution explained a total of 49.721% of the variance in the dataset, with component 1 contributing 40.053% and component 2 contributing 9.668%. Oblimin rotation (see Tables *6.10 & 6.11*) was performed to achieve a more simple structure and for clarity of interpretation, making it easier to see which variables were related to which factors as presented in the two tables of loading shown below. The Pattern Matrix confirmed the presence of a simple structure, with both components showing a number of strong loadings and all variables loading substantially high on one component, except postural stability, which appears to load highly on both components. Reading Passage 1, Reading

passage 2, 1 Minute Reading, Rapid Naming, 1 Minute Writing, Phonemic Segmentation, verbal Fluency, 2 Minutes Spelling, Backwards Digit Span and Postural Stability load strongly on factor 1. These items appear to measure literacy related cognitive deficits. Nonsense Passage Reading, postural stability and nonverbal reasoning show high positive loading on factor 2, therefore appearing to measure non-linguistic mental speed.

Table 6.10: Pattern Matrix(a)

	Component	
	1	2
Reading Passage 1 (RP1)	.912	
Reading Passage 2 (RP2)	.896	-.303
One Minute Reading (1MR)	.792	
Rapid Naming (RN)	-.653	
One Minute Writing (1MW)	.595	
Phonemic Segmentation (P Seg)	.570	
Verbal Fluency (VF)	.553	.316
Two Minutes Spelling (2MS)	.486	.374
Backwards Digit Span (BS)	.448	
Postural Stability (PS)	-.436	-.425
Semantic Fluency (SF)		
Nonsense Passage Reading (NPR)		.762
Non-Verbal Reasoning (NVR)		.727

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

a Rotation converged in 9 iterations.

Table 6.11: Structure Matrix

	Component	
	1	2
Reading Passage 1 (RP1)	.856	
Reading Passage 2 (RP2)	.777	
One Minute Reading (1MR)	.741	
Rapid Naming (RN)	-.711	-.403
Verbal Fluency (VF)	.676	.532
One Minute Writing (1MW)	.655	.387
Two Minutes Spelling (2MS)	.632	.563
Postural Stability (PS)	-.601	-.595
Phonemic Segmentation (P Seg)	.597	
Backwards Digit Span (BS)	.498	.304
Semantic Fluency (SF)	.382	.375
Nonsense Passage Reading (NPR)		.755
Non-Verbal Reasoning (NVR)		.721

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

As a result, principal component analysis identified two factors that explain a total of 49.721% of the variance in the dataset. These factors were interpreted as: i) Factor 1: the measure of literacy-related cognitive deficit and ii) Factor 2: the measure of non-linguistic mental speed.

6.4 Discussion

Results of this study allowed establishing norms of DAST for the UAE higher education and exploring manifestations of dyslexia in Arabic language. Literacy attainment (one minute reading, two minute spelling and one minute writing) yielded consistent results amongst both Emirati and English speaking cohorts. Both cohorts showed similar levels of performance on two Arabic-DAST subtests. However, exploring the results of reading performance from the 'One Minute Reading Test', which assesses the number of single words read correctly in one minute, it appears that Emirati students' performance exceeded the performance of the English cohort. Nonetheless, reviewing the results of the two reading passages confirms that this was not the case and the performance of both cohorts was alike. Reading passages detected a further 3.2% of cases of poor reading skills amongst Emirati students which were not identified by the one-minute reading test. As accuracy in Arabic language is dependent on a textual context, single word reading presents ambiguity in terms of pronunciation and comprehension, and additionally it fails to identify phonological deficits. Furthermore, low transparency in Arabic orthography makes reading an extremely difficult task even for skilled readers due to several words being visually and orthographically homographic (they look alike), but which are pronounced differently and carry distinct meanings.

Therefore, single word reading accuracy is not an accurate indicator of reading performance amongst Emirati students. Assessment of text reading and reading fluency along with speed of single word reading can provide a more precise measure of the reading level of Emirati students. Therefore, reading passages should be used alongside the 'One Minute

Reading Test' as a diagnostic measure of the reading performance of Arabic speaking learners, or even performance on speed independent from accuracy.

As previously highlighted, due to the nature of the Arabic language and the presence of homographs (one word with various meanings) and un-vowelized text, readers of Arabic depend highly on contextual clues for accurate reading and comprehension. Therefore the presence of nonsense words in a text poses an additional challenge for readers of Arabic, as their ability to break down un-vowelised non-words into chunks that can then be articulated is poor. Therefore dyslexics or poor readers of Arabic, who have not had enough exposure to the language and not yet mastered all vowels, letter-sounds and grammatical rules, may find difficulties in relying on the textual context in word prediction and comprehension when presented with a non-word text. Hence, the poor performance of Emirati students on nonsense passage reading could be attributed to low transparent Arabic orthography and a lack of experience of reading non-vowelized words.

Factor analysis revealed two components: i) literacy-related cognitive deficits and ii) non-linguistic mental speed. These factors are significant in terms of diagnostic and support frameworks for dyslexic Emiratis students. Nonetheless, the clustering of the variables differs somewhat from the study conducted in 2008. Reading Passage 1, Reading passage 2, 1 Minute Reading, Rapid Naming, 1 Minute Writing, Phonemic Segmentation, verbal Fluency, 2 Minutes Spelling, and Backwards Digit Span load strongly on 'measure of literacy-related cognitive deficits'; while Nonsense Passage Reading, and Nonverbal Reasoning show high positive loading on the 'measure of non-linguistic mental speed'. In addition, Postural Stability loads strongly on both components. This variation could be due

to the fact that the participants were not monolingual speakers of Arabic and a true representation of Emiratis.

Results of the study showed that 5.7% of the participants performed poorly on literacy and phonological tasks combined. This is an indication that phonological deficit continue to be present in adulthood, this can be due to the quality of compensatory skills developed during time. Therefore, one can argue that phonological deficit can be indicator of dyslexia in Arabic language.

CHAPTER 7

Study 2: Assessment of Counselling and Support Needs of Emirati Dyslexics

7.1 Introduction

The second study focuses on examining the counselling and support needs of Emirati dyslexics, which was achieved through the administration of a 75-item questionnaire to the 280 HCT students. The questionnaire was divided into five sections: counselling services in general, counselling staff, students' academic problems, students' psychological and emotional problems, and students' social problems.

7.2 Experimental Procedure

7.2.1 Design and construction of the questionnaire

Counselling can be extremely influential in terms of promoting self-awareness, enabling students to recognize their limitations and strengths, and encouraging the evaluation of their own progress (James, 1979). Therefore it could be argued that receiving counselling is fundamental to student success. The principles of counselling are focused upon the individual and should be dedicated to supporting individuals towards recognizing their needs and the world around them as it imposes on their dreams and plans, so that they may realize their aptitudes to the best of their potential (Miller, 1965).

The constructive outcomes of counselling can be observed in improved academic survival techniques, work discipline, optimal planning of studies, and success in examination performance. In addition, it can be influential in respect of the students' behaviour in matters

of information and communication. Augenstin (1979) noted that counselling could lower the threshold of any anxiety which results from being in higher education. Hence, the majority of universities in developed countries tend to institute counselling centres with qualified counsellors. However, universities in developing countries have been struggling to discover appropriate counselling programmes to manage various student needs and difficulties.

Therefore to examine the adequacy of counselling services and identify the needs and difficulties facing dyslexic students a questionnaire was designed to assess counselling and support needs of dyslexic students in HCT. A questionnaire was chosen as it seemed the most appropriate method of obtaining relevant data, and it is the most commonly used instrument in descriptive and survey studies. The questionnaire was developed subsequent to a thorough and extensive research through the following means:

- Researcher's personal experience as a counsellor in the HCT for 5 years
- Official reports and documents available through the college in the field
- Site visits to counselling centres in the UK, Kuwait and the UAE
- Interviews with a number of counsellors in the UAE (HCT, Al Amal Hospital, Dubai Community Health Centre), UK (Sheffield University, University of Hull and private counsellors) and Kuwait (The Centre for Child Evaluation and Teaching).
- Literature review on counselling and guidance

The discussions and interviews during different site visits to explore their counselling programmes have led to five main themes: a) counselling staffs' qualifications and training,

b) Counselling services and resource availability, c) specialised counselling programmes according to the needs of the clients (academic & psychological) , and d) policy statements.

The above themes were then organised into four categories and a draft version of the student questionnaire was then constructed containing 4 sections with 45 items, as listed below:

A. Counselling services

1. Counselling services offer support with any issue students might have
2. Counselling services offer individual and group counselling
3. Counselling services offer sufficient time for counselling
4. There are specific and confidential counselling rooms
5. Counselling services plan group activities focusing on students' personal growth and development
6. Counselling services market for their services through newsletters
7. Counselling services evaluate services through feedback forms
8. Counselling services collaborate with a committee to find the best approach to support students
9. Counselling services keep counselling notes

B. Counselling staff

1. Counsellors are experienced and help students deal with their issues and difficulties
2. Counsellors help the students make the right decisions (academic and personal)

3. Counsellors are committed to helping students
4. Students can book counselling sessions easily

C. Students' academic problems

1. Counsellors plan activities aimed at academic support
2. Counsellors assist students with academic problems
3. Counsellors assist students to understand reasons for their academic problems
4. Counsellors explore reasons for students' academic problems
5. Counsellors help the students overcome their academic problems
6. There is a support mechanism for students with learning disabilities
7. There are many exams each semester
8. College exams are too difficult
9. Students don't have academic problems
10. There are far too many students in each classroom
11. Lectures are the main teaching methods in the college
12. Library rooms are too small
13. There is lack of relationship between students and teachers
14. Exam procedures in the college are complicated
15. There are no recreational activities
16. Counsellors do not provide academic support
17. There are inadequate resources for scientific research

D. Students' psychological and emotional problem

1. Counselling programmes deal with student's psychological problems
2. There are students who have anxiety problems
3. There are students who are shy
4. There are students who are oversensitive
5. There are students who get tired easily
6. There are students who feel depressed
7. There are students who feel lonely
8. There are students who are unable to express their own feelings
9. There are students who have low self-confidence
10. There are students who hesitate to tell counsellors about their problems
11. There are students who cannot control or manage their anger
12. There are students who forget easily
13. There are students who cannot make up their minds
14. There are students who suffer from mood swings
15. There are students who are inattentive during lectures

The draft version of the student questionnaire was then presented to a committee consisting of two specialised professional counsellors from the UAE University and two counsellors from the HCT. A modified and final version of the questionnaire was designed in the light of the suggestions made by the members of the committee. Their suggestion and advice resulted in:

- Inclusion of a fifth section: Students' social problems, with 7 items
- Addition of a total of 23 items under sections A, B, C, & D as shown below
- Suggestions on rephrasing some of the items

- Items were restructured and streamlined under each category as suggested by the committee

The following items were suggested by the committee and included under each section:

A. Counselling services
    1. Counselling services offer individual counselling only
    2. Counselling services offer group counselling only
    3. Counselling services provide information about services and activities to all students
    4. Counselling services offer specific programmes to help students with their varying needs.

B. Counselling staff
    1. Students can book a session with any counsellor they prefer
    2. Students trust their counsellors

C. Students' academic problems
    1. Students have difficulty reading, writing and spelling
    2. Counsellors provide information about learning disabilities to all students
    3. There are students with learning disabilities in the college
    4. Equipment in the library is inadequate
    5. Teachers frequently miss classes
    6. Students do not have a choice over courses registered
    7. There is a lack of classroom discussion

8. Course content is difficult
9. There are too many subjects each semester
10. Students suffer from overloaded syllabus
11. Curriculum is not relevant to the future career
12. There are inadequate library resources
13. Social and extra-curricular activities are very rare

D. Students' psychological and social problems

1. There are students who have low self-esteem
2. There are students who feel confused
3. There are students who depend on others to solve their problems
4. There are students who prefer to live alone

E. Students' Social problems

1. Counselling programmes address students' social problems
2. There are students who do not have transportation to and from college
3. There are students who live far away from home
4. There are students who have family disputes at home
5. There is parental interference in student's personal affairs
6. There are conflicts between a student's and their parents' values
7. There are students who find it difficult to make friends

The final draft of the questionnaire was given to two of the teaching faculty at Dubai Women's College and three part-time support staff members who are first year students and were asked to assess the clarity of the items on the questionnaire. They found almost all of the items easily understood, but suggested rewording the 6th item under section C from "There is support mechanism for students with learning disabilities" to "learning disability support exists". Their suggestion was taken into consideration and the change was implemented.

The final student questionnaire contained 75 items and was divided into the following five sections (Appendix B).

Section A: Focuses on counselling services and contains thirteen items.

Section B: Focuses on counselling staff and contains six items.

Section C: Focuses on counselling programmes and students' academic problems and contains thirty items.

Section D: Focuses on student's opinions about counselling programmes and students' psychological and emotional problems. It contains nineteen items.

Section E: Focuses on counselling programme and students' social problems. It contains seven items.

Close-ended questions were used in this survey, as "*Closed questions are easier and quicker to answer, they require no writing and quantification is straight forward. This often means more questions can be asked within a given length of time*" (Oppenheim, 1960, p. 43).

All five sections contain a Likert-scale, listing responses as: strongly disagree, disagree, uncertain, agree and strongly agree. Scores for each response ranged from '5' for highly positive to '1' for highly negative. "*The Likert technique is easier to use in developing an attitude scale than Thurstone technique, and gives an almost equally good result. It is currently the most widely used technique*" (Ebel, 1972, p. 526).

7.2.2 Administration of the student questionnaire

All 280 participants attended a briefing session held at DWC during the first week of April 2009, during which information about the study was provided. Participants were assured that their participation would not jeopardize their academic performance or records in any way. They were also assured that the results of the study would be reported as a group and their individual responses would not be available to anyone other than the researcher. The right to withdraw from the study at any time was made clear.

Subsequently, a 75-item student questionnaire intended to assess counselling and support needs of dyslexic students in HCT was administered by the researcher to 280 participants. All the participants completed the questionnaire willingly. The researcher was present throughout the session to address any queries raised by the participants, and to ensure that the participants diligently completed the questionnaire, as "*Questionnaires administered personally to groups of individuals have a number of advantages. The person administering the instrument has an opportunity to establish rapport, to explain the purpose of the study and to explain the meaning of the items that may not be clear*" (Best, 1981, p. 167). All 280 completed questionnaires were collected by the researcher after the session.

The questionnaire was administered by the researcher. Following the administration of the study, all the questionnaires were collected. This process of questionnaire administration and data collection ensured 100% completion of the questionnaire in one setting, eliminated the issues of unreturned questionnaires and reduced follow-up time. Nevertheless, the process of transferring the data into an electronic format for easier retention and analysis was very lengthy and laborious. The researcher spent over 50 hours populating a spread sheet with appropriate data.

At that stage a paper-based questionnaire was more appropriate as not all year one students had had their laptops delivered and the computer lab capacity at the HCT was not sufficient to have all 280 participants complete the questionnaire at the same time.

It must be noted that the reason for not using a pilot study was due to the fact that there were some operational difficulties to get a group of students in the same venue at the same time, prearrange with their faculty to ensure they were not getting marked absent, book appropriate facility, and communicate with all the participants by phone and email. Additionally, many of the participants used the students' transportation and were bound by the bus schedule, so two-session approach was not possible; therefore a pilot study was not carried out for the administration of the questionnaire. The review conducted by the two teaching faculty and three temporary staff who were students at the same level was deemed sufficient. Additionally, the administration of the study was conducted by the researcher to ensure a fair completion and response to any inquiries the participants might have during the session.

7.2.3 Results and Analysis

7.2.3.1 Descriptive Statistics & Effect Size

To measure the magnitude of the observed effect, effect size was calculated using the difference between the two means divided by the standard deviation of DAST, using the effect size formula below:

$$Es_m = \frac{\text{Dyslexic Mean} - \text{Non-Dyslexic Mean}}{\text{Non-Dyslexic } .sd}$$

Table 7.1 provides a summary of the calculations for effect size. A substantial large effect size was observed with the following variables related to counselling services and counselling staff: (i) many Subjects (Esm = -1.04), indicating that dyslexic students thought that there were too many subjects to study each term; ii) adequate services (Esm = -0.82), indicating that there is a lack of adequate counselling services to meet their needs; iii) sufficient time (Esm = -0.7), indicating that time allotted for counselling is insufficient; iv) tired (Esm = -0.65), indicating that they easily experience tiredness after performing a simple task; and v) special programmes (Esm = -0.63), indicating the absence of special programmes to address their needs. A medium effect size was evident with the following variables: i) no support (Esm = -0.55); ii) staff experience (Esm = -0.43); iii) group and individual problems (Esm = -0.30); iv) evaluations (Esm = -0.45); v) LD information (Esm = -0.45); and vi) trust (Esm = -0.37) indicating that there is no adequate support for dyslexic students and the services available focus on group needs rather than individual students' needs. Staff appear

to lack the expertise to deal with dyslexic students or to provide information about learning disabilities for students, the evaluation and follow up of counselling services are unavailable, and amongst dyslexic students there is a lack of trust of the counselling staff. A medium effect size was also observed in the following variables related to academic problems: i) crowded classrooms (Esm = -0.5); ii) class discussion (Esm = 0.45) and iii) select (Esm = 0.49), appearing to indicate that classrooms are overcrowded, class discussions are rarely held and that they do not have a choice over selecting their programme of study. Feeling of low mood (Esm = -0.32), confused (Esm = 0.41), express (Esm = 0.32) and shy (Esm = 0.43) showed a medium effect size, indicating that dyslexic students reported the presence of the following psychological difficulties: low mood, confusion, difficulty expressing their opinions and shyness.

Table: 7.1 Descriptive Statistics & Effect Size

NO	Code	Items	Dys Mean	Dys SD	Non-Dys Mean	Non-Dys SD	Effect Size
1	Adeqserv	Counselling services offer support with any issue students might have	2.46	1.51	3.59	1.37	-0.82
2	Ingr	Counselling services offer individual and group counselling	2.85	1.34	3.24	1.29	-0.3
3	Suftim	Counselling services offer sufficient tine for counselling	2.23	0.93	3.17	1.35	-0.7
4	Spac	There are specific and confidential counselling rooms	4.77	0.44	4.78	0.45	-0.02
5	Plan	Counselling services plan group activities focusing on students personal growth and development	3.31	0.95	3.58	1.3	-0.21
6	Pubinfo	Counselling services market for their services through newsletters	3.46	1.61	3.67	1.42	-0.14
7	Evalu	Counselling services evaluate services through feedback forms	2.62	1.45	3.24	1.37	-0.45
8	Specprog	Counselling services offers specific programmes to help students with their varying needs	1.62	0.65	2.37	1.19	-0.63
9	Collab	Counselling services collaborates with the committee to find the best approach to support students	2.77	0.73	2.76	0.94	0.01
10	Outreach	Counselling services provide information about services and activities to all students	3	1.47	3.21	1.36	-0.16
11	Recrd	Counselling services keep counselling notes	4.46	0.52	4.33	0.67	0.2
12	Sufstaf	Students can book counselling sessions easily	2.85	1.82	3.14	1.73	-0.17
13	Stafexp	counsellors are experienced and help students deal with their issues and difficulties	1.62	0.51	2.04	1	-0.43
14	Influence	counsellors help students make the right decision (academic & personal)	3.08	1.38	3.23	1.32	-0.12
15	Acessany	Students can book a session with any counsellor they prefer	3	1.53	3.2	1.44	-0.14
16	Dedicate	Counsellors are committed to help students	2.92	1.5	2.85	1.21	0.06
17	Trust	Students trust the counsellors	3.23	1.24	3.69	1.25	-0.37
18	Acadconcer	Counsellors plan activities aimed at academic support	3.69	1.25	3.8	0.97	-0.11
19	Followup	Counsellors assist students with academic problems	2.85	1.52	2.9	1.44	-0.04
20	Investigate	Counsellors explore causes for students' academic problems	3.54	1.05	3.39	1.37	0.11
21	Assist	Counsellors assist students understand reasons for their academic problems	2.85	1.34	3.1	1.45	-0.17
22	Asistacd	Counsellors help students overcome their academic problems	2.69	1.65	3.07	1.48	-0.26
23	Ldsupp	Learning disability support exist	2.62	1.45	3	1.42	-0.27
24	Atainmnt	Students have difficulty reading, writing & spelling	4.46	0.66	4.3	0.6	0.27

25	Ldinfo	Counsellors provide information about LD to all students	2.77	1.64	3.35	1.3	-0.45
26	LD	There are students with LD in the college	4.31	0.95	4.42	0.71	-0.16
27	Psyprb	There are students who are shy	3.08	1.61	3.29	1.4	-0.15
28	Anxiety	There are students who are oversensitive	4	0.71	3.92	1	0.08
29	Shy	There are students who get tired easily	4.62	0.51	4.25	0.85	0.43
30	Sensi	There are students who feel depressed	4.31	0.85	4.31	0.84	0
31	Tired	There are students who feel lonely	3.38	1.39	4.03	1	-0.65
32	Depres	There are students who are unable to express own views and feelings	3.08	1.26	3.48	1.29	-0.32
33	Inferior	There are students who have low self-esteem	3.92	1.26	4.11	0.87	-0.21
34	Express	There are students who hesitating to tell counsellor about their problem	4.54	0.52	4.34	0.64	0.32
35	Future	There are students who feel confused	4	1	4.16	0.79	-0.2
36	Hesitate	Counselling services offer support with any issue students might have	3.92	0.95	3.84	1.12	0.08
37	Confuse	Counselling services offer individual and group counselling	4.38	0.51	4.01	0.91	0.41
38	Atten	There are students who are inattentiveness during lectures	3.77	1.17	3.81	1.04	-0.04
39	Depend	There are students who depending on others to solve one's problems	3.92	1.04	4.11	0.84	-0.22
40	Anger	There are students who cannot control or manage anger	4.23	0.83	4.24	0.93	-0.01
41	Alone	There are students who prefer to be alone	4.23	0.6	4.19	0.89	0.04
42	Forget	There are students who forgets easily	4.38	1.12	4.21	0.91	0.19
43	Confidence	There are students who lacking self-confidence	4.31	0.48	4.15	0.96	0.16
44	Chngmind	There are students who cannot make up their mind	4.08	0.76	4.26	0.91	-0.2
45	Mood	There are students who suffering from mood swings	4.15	1.07	4.24	0.9	-0.09
46	Sociprb	Counselling programmes address student's social problems	2.62	1.39	3.06	1.53	-0.29
47	Transport	There are students who do not have transportation to and from college	4.38	0.87	4.34	0.64	0.06
38	Home	There are students who live far away from home	1.54	0.52	1.69	0.48	-0.32
39	Dispute	There are students who have family disputes at home	4.15	1.07	4.19	0.93	-0.04
50	Interfere	There are parental interference in student's personal affairs	4.23	0.44	4.22	0.9	0.01
51	Conflict	There are students who conflict as between parents students' values	4.54	0.52	4.42	0.55	0.22
52	Friends	There are students who find difficulty making friends	4.08	1.26	4.02	0.99	0.06

53	Indiv	Counselling services offer individual counselling only	3.08	1.32	2.43	1.36	0.47
54	Group	Counselling offer group counselling only	3.38	1.56	2.82	1.36	0.42
55	Exmpro	Exam procedures in the college are complicated	1.46	0.52	1.62	0.54	-0.29
56	Exmdiff	College exams are too difficult	1.31	0.48	1.44	0.58	-0.22
57	Mnyexms	There are many exams each semester	2.08	0.95	1.98	1.02	0.1
58	Lecture	Lectures are the main teaching method in the college	4.46	0.52	4.38	0.55	0.15
59	Clsdissc	There is lack of classroom discussions	4.62	0.51	4.32	0.64	0.46
60	Cntndiff	Course contents are difficult	2.54	1.61	2.75	1.35	-0.16
61	Mnysubj	There are too many subjects each semester	3.69	1.03	4.3	0.58	-1.04
62	Sylbhvy	Students suffer from overloaded syllabus	4.38	0.51	4.32	0.53	0.12
63	Career	Curriculum is not relevant to the future career	4.23	0.44	4.33	0.5	-0.2
64	Library	There are adequate library resources exist	1.54	0.52	1.58	0.57	-0.07
65	Smllrms	Library rooms are too small	4.23	0.44	4.39	0.55	-0.29
66	Labmatr	Equipment in the library are inadequate	4.38	0.51	4.33	0.48	0.11
67	Noscient	There are inadequate resources for scientific research	4.38	0.51	4.25	0.46	0.28
68	Absence	Teachers frequently miss classes	4.62	0.51	4.34	0.48	0.57
69	Relations	There is lack of relationship & communication between students & teachers	2.23	0.6	2.33	1.22	-0.08
70	Select	Students have no choice over courses registered	4.62	0.51	4.22	0.82	0.49
71	Noacdprb	Students don't have academic problems	4.38	0.51	4.3	0.49	0.17
72	Clscrwd	There are far too many students in each classroom	4	0.71	4.31	0.63	-0.5
73	Sociacti	Social & extra-curricular activities are very rare	4.46	0.52	4.36	0.51	0.19
74	Recracti	There are no recreational activities	4.38	0.51	4.35	0.5	0.06
75	Nosupprt	Counsellors do not provide academic support	2.62	1.39	3.31	1.28	-0.55

The results obtained from the student questionnaires indicate that counselling services at HCT are inadequate for dyslexic students, particularly with respect to the focus on group problems rather than individual student needs, the time allotted to counselling, the evaluation of and follow-up of programmes and lack of information and support for students with learning disabilities. Counselling staff were seen to be inexperienced in dealing with students' needs. In addition dyslexic students reported a lack of trust in their counsellors, which could render the counselling process ineffective in fulfilling the counselling objectives adequately.

According to dyslexic students, academic problems are related to overcrowded classrooms, methods of teaching and class discussion, the amount of subject matter taught each term and the opportunity to select the programme of study. It is interesting to see that dyslexics think that classrooms are overcrowded even though the number of students per section does not exceed twenty-five students. This highlights the needs of dyslexic students for additional support. Usually students with lower high school averages are placed on the Diploma Foundation programme with only three specializations, as they do not meet the entry criteria to enrol in the Higher Diploma or Bachelor programmes. Hence dyslexic students feel that they do not have a choice over selecting their programme of study. They also expressed difficulty expressing their opinions, feeling confused, sad, shy and tired.

This study shows that counselling services at the HCT are in need of further enhancement, mainly with regard to counsellors' qualifications and their competency in identification of students' needs and intervention. There is evidently a great need for a more developed and effective model to cater for all HCT students, including those with learning disabilities

CHAPTER 8

Study 3: Intervention and Support Programme for Emirati Dyslexic Students

The third study aims at implementing a specially-developed intervention and support programme to those students who were identified as dyslexic in the first study. The academic progress of the participants was monitored and assessed prior to and after their participation in the intervention through both student and teacher evaluation. Students and teachers completed self/teacher evaluation questionnaires before and after the administration of the intervention programme. The intervention programme focused on three elements: 1) Literacy training, 2) Enhancing learning strategies and building self-awareness and 3) improving memory. Following their participation in the intervention programme, dyslexia indicator subtests were re-administered amongst the participants and their performance was compared with their scores obtained in study 1, to examine the effectiveness of the intervention programme in addressing the needs of Emirati students with dyslexia and its impact on the participants' academic performance.

8.1 Introduction

"Education and employment can make or break an adult with dyslexia" (Reid & Kirk, 2001). Although early and culturally-appropriate diagnosis is essential, appropriate intervention and support are equally important and constitute the main elements which help students with dyslexia to develop that self-efficacy which is an important contributor to achieving educational and career aspirations. Diagnosis in isolation of effective and appropriate intervention and support could potentially lead to further frustration, anxiety

and emotional distress. As suggested by Wearmouth et al. (2004), dyslexics are continuously faced with demands as every situation confronts them with new challenges. According to Reid and Hinton (1999), stress, health problems and unemployment can result when demands exceed the resources of adults with dyslexia, and similarly Hoffmann et al. (1987) argue that adults with dyslexia are always under pressure as they strive to meet external demands and expectations. Therefore, an appropriate intervention and support programme is crucial not only to assist adults with dyslexia achieve their potential and fulfil their educational and career goals, but also to allow them to cope with day-to-day demands and expectations.

An effective intervention and support programme is one which addresses the needs of its target group. Literacy skills are without doubt the key to academic success, especially at college level. However, other issues need to be considered when developing a support programme for adult dyslexics as their needs and expectations differ from those of children. The main aim of such intervention and support programmes is to help adult students with dyslexia acquire the skills and abilities which will help them become autonomous learners (Reid & Kirk, 2001). Additionally, literacy training in isolation seems to be ineffective in the case of adult dyslexics. McLaughlin et al. (1994) state that literacy, life skills and coping mechanisms constitute the main elements of successful support programmes for adults with dyslexia.

According to many researchers such as Miles (1994), the emphasis on literacy skills and remedial support "diverts attention" from the actual needs of dyslexics and is a "demoralizing and inappropriate" method of support for adult dyslexics as it carries a negative connotation related to "deficit" and "alludes to dependency" (Reid & Kirk, 2001). Support and intervention programmes for adults with dyslexia in higher education should focus on both aptitude development and appropriate accommodation, a model

which is referred to by Reid and Kirk as “a social model”, a model through which both the individual and the institution are equally responsible for achieving the outcome of the intervention and support programme for adults with dyslexia. Adult students with dyslexia need to enhance their learning ability and skills to feel empowered and autonomous, and take responsibility for their education. In addition, a suitable environment supported by policy is another requirement, as this allows adults with dyslexia to demonstrate their learning. Some examples of such support are extra time allowed during examination, printed notes and taped lectures, counselling and emotional support, career advising, and training in effective learning strategies.

Therefore the success of an intervention and support programme is highly dependent upon its relevance to the needs of the individuals, especially in the context of the current research in the UAE, as dyslexic students may not have been diagnosed and hence will not have been able to develop compensatory skills to enable them achieve academic success.

Many years of interaction with Emirati students as a Counsellor and Student Affairs Supervisor resulted in understanding their views about intervention and support programmes. This type of intervention programme, which aims at skills development rather than literacy remediation, is unfamiliar to all students, especially dyslexics, as counselling and support services in the government school system pay very little attention to the needs of individual students but rather focus on group issues. The concept of remediation as it is familiar to educators, students and parents is used to refer to “extra tuition” or “basic literacy training”. It mostly stresses rehearsal and repetition, and the need for private tuition after school hours. This is a practice which indirectly leads students with dyslexia to develop a “dependency culture” as suggested by Reid and Kirk (2001) and leave others in charge of their learning, even blaming others for their failure.

Therefore, acknowledgment of the needs of each dyslexic student (Klein & Sunderland, 1998) and involving them in the decision-making process is crucial to the success of any intervention and support programme.

Students with dyslexia in higher education experience varying degrees of learning difficulties and require different types and levels of support, intervention and accommodation. To address the needs of students with dyslexia in higher education, it is fundamental to institute a clear policy statement and guidelines, and utilize a variety of resources as it becomes impossible for the teaching faculty and lecturers alone to meet the learning needs of each individual student. At this stage of education, in addition to support, mentoring and self-advocacy become important to adults with dyslexia, as at this stage they are not only gaining education but are also being prepared for employment. Establishing links and partnerships with local industries, especially ones which are familiar with students' cultural background and the institution's requirements, is a significant resource for suitable mentors.

The main goal of education is to train young people to become effective members of society (Armstrong, Henson & Savage, 1985). This implies that in addition to academic knowledge, students will learn how to make decisions, resolve conflict, think for themselves and act in a responsible manner (Fiske, 1991). This indicates that schooling enables students to become self-determined and self-advocate for their own needs. According to Blalock and Patton (1996), most non-disabled students acquire a firm foundation in the skills required for self-determination. These skills require the ability to plan, organize, and initiate behaviour; therefore acquisition of these skills poses a unique challenge for students with learning disabilities (Field, 1996). Furthermore, ability to seek help and initiate conversation is an additional challenge (Hersh, Stone & Ford, 1996). Therefore, it is imperative to provide instructions on self-advocacy for students with

learning disability and to equip them with the skills needed for self-determination (Cronin, 1996; Field & Hoffmann, 1996; Weimer, Cappotelli & DiCamillo, 1994).

In 1994, Weimer et al. constructed a self-advocacy programme for adolescents with special needs and suggested that such structured programmes show positive outcomes if implemented in the early years of schooling. They suggest that self-advocacy begins as students start to make curriculum choices during middle school. However, they documented that self-advocacy skills tend to be deficient even amongst college students, as many of them tend to be incapable of assessing their own skills. The self-advocacy programme proposed by Weimer et al. includes the following three goals: 1) developing knowledge and awareness of self-advocacy, 2) transforming self-advocacy knowledge and awareness to life skills and 3) understanding that success depends on the ability to self-advocate.

In all different educational systems around the world, students are expected to recall academic content and specific factual information to become successful, especially during examinations. In other words, memory of factual curriculum information is fundamental to achieving academic success. Students diagnosed with learning disabilities usually show poor memory of academic content (Cooney & Swanson, 1987).

Research demonstrated that children with dyslexia suffer from a deficit in immediate or working memory. Deficit in digit span is one of the most common manifestations of dyslexia (Miles, 1983). Working memory impairment limits the capability to learn complex skills and acquire new knowledge and can be a hurdle to success. Individuals with deficits in working memory face noticeable learning difficulty. Therefore, understanding how their own memory works and adopting suitable approaches to cope with this deficit will enable students with dyslexia to devise study plans tailored

to address their needs and utilize the most appropriate memory-improving strategies to support and enhance their own memory.

Thus, the proposed intervention and support programme focuses on meeting the needs of Emirati Adults with dyslexia through providing opportunities for adults with dyslexia to develop self-awareness, improve their learning skills and memory, and become in charge of their own learning.

Below is an outline of the proposed intervention and support programme for Emirati students with dyslexia:

1. Literacy training (achieved by teachers pacing their presentation of the material during lessons to suit dyslexic students' speed of learning)
2. Enhancing learning strategies and building self-awareness in terms of academic performance (achieved by training dyslexics on study skills, attention and concentration, organization skills, and time management)
3. Improve memory and accelerate learning (imagination and association, visualization, the link method and the journey method)

8.2 Experimental Procedure

Table 8.1 provides brief information about the stages of intervention, intervention sessions, and timetable for the duration of 22 weeks of the intervention programme, the activities conducted and the number of hours participants were actively engaged as well as the post-intervention activities. Detailed account of the same is provided in the following section. A table containing the same information was given to the participants as well.

Table 8.1: Intervention stages and intervention sessions timetable

Stage 1: Pre-intervention:
Academic Week 9 (Tuesday 27/10/2009): English and Maths Diagnostic Assessments and grades finalised for Diploma and Higher Diploma Foundations.
Academic Week 10 (Sunday 01/11/2009): • All participants (students and teachers) attend debriefing session and sign consent letters. • Teachers complete pre-intervention "Teacher Student-assessment" • Students complete pre-intervention "Student Self-assessment" • Participants' grades in Maths and English "week 9 diagnostic results" was obtained • Participants' scores on a-DAST dyslexia indicator subtests were obtained from the normative data collected for the second study
Stage 2: Intervention: • Commence on academic week 11 (the week starting Sunday 8/11/2009). The sessions took place every Wednesday from 1200 to 1400 hours. Each session included 10 minutes break. • No sessions planned on 02/12/09, UAE National Day Holiday • No sessions planned during Final Exam Week Sem.1 (27/12/09 to 7/01/10) • No sessions planned during Mid-year break (10/01/10 to 21/01/10)

Week of intervention	In-class Activity	Duration (hrs.)	Independent / Individual/ Group Activity
Week 1 (11/11/09) Sem.1	Introduction & Ice breaker. Study skills: Pre-session	2	3 truths and 1 lie – ice breaker (**group**) Study skills worksheet 1 **(individual).**
Week 2 (18/11/09) Sem.1	Study Skills 1: Active learning strategies	2	List 5 ways which can help you become an active learner **(individual).** How can you be involved in your education? How can you find interest in your classes **(group)**
Week 3 (25/11/09) Sem.1	Study Skills 2: Asking questions (how, where & When) Setting priorities (how & why)	2	Identifying priorities task (academic and non-academic) **(independent)** How can you minimise/eliminate confusion? **(group)**
Week 4 (9/12/09) Sem. 1	Study Skills 3: Being prepared, ready and engaged Motivation and achievement	2	What should I do before, during and after the lessons? **(group)**

Week 5 (16/12/09) Sem. 1	Study Skills 4: <u>Keeping things in perspective</u> <u>Being involved in college life</u>		List number of new people you have met since you joined HCT (must not be classmates)? **(individual)** How can you get to know more people **(group)**
Week 6 (23/12/09) Sem. 1	Study Skills 5: <u>Learning style</u>	2	What is my learning style? **(individual)**
Week 7 (27/01/10) Sem. 2	Study Skills 6: Reading and discussion (3 habits) from Stephen Covey	2	How can you utilize these habits in everyday life? **(group)**
Week 8 (3/02/10) Sem. 2	Study Skills 7: Session time used to conduct the treasure hunt activity in the college. The activity focusses on developing awareness of range of services, activities and resources available for students.	2	College Treasure hunt **(group).** Participants were given a list of the main services, key people, and resources available to them, and were asked to find out what is on offer, the location and the person in charge.
Week 9 (10/02/10) Sem. 2	Time management strategies (1)	2	When do you normally start working on your assignments?

	Procrastinations ABC priority list SMART Goals		How do you get the most out of your day **(independent)** Setting my goals
Week 10 (17/02/10) Sem. 2	Time management strategies (2) Planning ahead Assignment/project execution plan	2	3 Case Studies (identify what went wrong and suggest what could have been done) **(group)**
Week 11 (24/02/10) Sem. 2	Time management strategies (3) Reflection on your time management	2	Review, Think and Reflect worksheet **(individual)** Self-assessment **(individual) then discuss in pairs**
Week 12 (03/03/10) Sem. 2	Time management strategies (4) Strategy implementation Review all the material presented	2	Use your timetable, Maths & English course cover sheets and create your study / project execution plan. Don't forget to include extra-curricular and social activities **(independent) then discuss in pairs**
Week 13 (10/03/10) Sem. 2	Attention and concentration	2	Why is it important to pay attention in class? List 5 reasons **(individual)**

			How to prevent distraction and increase concentration? (**group**) Concentration target activity **(individual & independent)**
Week 14 (17/03/10) Sem. 2	Organization skills 1	2	What do you think about these scenarios: Scenario 1: You call 999 for an emergency; the paramedics arrive without any kit. Scenario 2: Your parents call an electrician, and he arrives without his tool box and asks your neighbour to borrow their tool box. Scenario 3: your brother arrives for his football match without his gear. **(Group)**
Week 15 (24/03/10) Sem. 2	Organization skills 2 <u>Balancing college and social life</u>	2	What are some of the things that will help you improve your organizational skills and balance your college and social life? **(individual & group)**

Week 16 (31/03/10) Sem. 2	Test Taking strategies <u>Test preparation</u> <u>Test taking and Reviewing tips</u> <u>After the test</u>	2	What affects your test taking ability? (individual) Work in pairs and come up with a list of things to do before and after the test.
Week 17 (07/04/10) Sem. 2	Memory (1) <u>Imagination</u>	2	<u>Memory Exercise</u>: memorize a list of 20 random words in 2 minutes and write down as many as you can remember in the same order **(individual)** <u>Imaginations exercise</u>: assume you own the original of Leonardo da Vinci's Mona Lisa; write down as many possible uses for it as you can think of **(individual)**
Week 18 (14/04/10) Sem. 2	Memory (2) <u>Association</u>	2	List of feelings triggered at the sound of **(individual & group –** complete individually then share in groups**):** - telephone ringing - call for prayer - fire engine siren

			List of things you think of when you see **(individual & group –** complete individually then share in groups**):** - snow - pair of wellingtons - flower bouquet
Week 19 (21/04/10) Sem. 2	Memory (3) <u>Visualization</u>	2	When did you have breakfast today, what did you do before and after breakfast? **(individual)** Use visualization technique to memorize Ayat Al Korsi "verses from the Holy Qouran"
Week 20 (28/04/10) Sem. 2	Memory (4) <u>The Link Method</u>	2	Round 1: Memorize a list of 20 unconnected wards in order. Round 2: Memorize a list of 20 unconnected wards in order using the link method. Link each word together using a bizarre story. Round 3: Memorize a list of 20 unconnected words

			in order using the link method. Link each word together using a bizarre story. Try to exaggerate and bring in all your senses. Concentrate and visualise as much details as you can imagine. Note your scores and compare them. **(individual), followed by group discussion.**
Week 21 (05/05/10) Sem. 2	Memory (5) <u>The Journey Method</u>	2	Prepare a mental route consisting of 10 stages, this can be your typical journey to college, choose 10 memorable landmarks which follow a logical direction, and learn your route before looking at the words on the page. Once you are comfortable with your route, mentally place each word against the landmark on each stage of the journey. Use all your senses to see all the details such as listen to the traffic, the climate, and the smell in the surrounding. Use as

			much time as you want. Don't rush and enjoy your journey. **(individual), followed by group discussion.**
Week 22 (12/05/10) Sem. 2	Overview of all the offerings. Introduction of the final stage of the study: post-intervention processes	2	Bring in your packet of all the exercises completed over the 21 weeks. In class discussion and reflection on what have you achieved/learned? What are your goals?

Stage 3: Post-intervention (week 23 – 19th May, 2010)

- Students' final grades in English and Maths were obtained
- Teachers complete post-intervention "Teacher Student-assessment"
- Students complete post-intervention "Student Self-assessment"
- A-DAST dyslexia indicator subtests (passage reading, two minute spelling, nonsense passage reading, backwards digit span and phonemic segmentation) were administered

8.2.1 Material developed and Used

- **Academic progress report** (pre-intervention and post-intervention)

A form was designed to capture academic performance through obtaining participants' grades in two subject areas, English and Maths, before and after participating in the intervention and support programme. Faculty completed two forms for each student, one before and one after their participation in the intervention

programme. These forms captured dyslexic students' grades in Maths and English. The data were then transcribed for the purpose of analysis.

- **Learning strategies and Study Skills**

Based on the literature review, the site visits and the interviews conducted with specialists in the field of dyslexia at Sheffield University, United Arab Emirates University, Centre for Children Evaluation and Teaching and the Higher Colleges of Technology, an intervention programme was designed to address the needs of the Emirati dyslexics in the HCT. The findings from the second study and cultural background of the participants were also taken into consideration while devising the intervention programme. During this information gathering attempt it was obvious that the difficulties dyslexic students face are not limited to reading, writing and spelling, but they may experience challenges with a range of tasks which students generally encounter in higher education, such as study skills and learning strategies, time management, and goal setting. Mortimore and Crozier (2006) reported problems with time management and organizing coursework, writing assignments and examination answers. A survey of the barriers to learning by Fuller et al. (2004) identified difficulties with learning from lectures, using learning resource centres and libraries, and producing coursework assignments. Problems with telling the time and time-keeping, concentration, note taking, writing, and word retrieval (McLoughlin et al. (1994); Gilroy & Miles (1996), Klien (1993). Nicolson and Fawcett, (1990) reported that some students experience difficulties with motor skills and coordination, consequently they are challenged with keyboarding skills and writing scripts. Dyslexic students experience difficulties with their programme of study and academic attainment, they underperform and are more likely to withdraw after their first year (Richardson and Wydell, 2003). The scope of the difficulties highlighted in this section is consistent with the definition of dyslexia

provided by the UK Dyslexia Institute of specific learning difficulties "*as organising or learning deficiencies which restrict the students' competencies in information processing, in motor skills, and working memory, so causing limitations in some or all of the skills of speech, reading, spelling, writing, essay writing, numeracy and behaviour"* (cited by Mortimore and Crozier 2006: 236).

The results of the second study presented in Chapter 7 surveying the counselling and the support needs of Emirati dyslexics also indicated that dyslexic students face difficulty with memorising, accessing library and other resources, concentrating, comprehending and engaging in classroom discussions, organising and managing time, and performing well academically.

Therefore the intervention and the support programme was purpose-built to address the various areas of difficulty faced by dyslexic students. The intervention programme focused on developing self-awareness which was presented through completing self-assessment questionnaires and actively participating in independent, individual and group activities; improving learning and memory skills was introduced through participation in skill development workshops addressing study skills, time management, test taking strategies and strategies to enhance memory; and nurturing independence and life-long learning practices. Below is full detail of the structure and content of the programme. A brief outline of the intervention programme and the intervention staged, number of sessions offered, duration of each session and the type of activities was also offered in Table 8.1.

Introduction and Ice breaker

During the first session, the participants were thanked for agreeing to take part in the research study. They were reminded that their participation was voluntary and the right to withdraw at any stage was reiterated.

All the dyslexic students taking part in this study participated in a group activity (say 3 truths and 1 lie) which aimed to help increase the comfort level and familiarity amongst the participants. The participants sat in a circle. Each participant took turn giving three true statements about themselves and one that was not. They were advised not to share information which was "too personal". The rest of the students tried to guess which statement was not true. This helped the students to warm up, learn some details about each other that they might not have otherwise, engage in conversation based on what they had in common, and get acquainted with each other.

The participants were then reminded of the objective of the study and the process of the intervention programme was thoroughly explained to them. All the dyslexic students received a schedule of the sessions outlining the content of each of the sessions, the time, date and the venue in which the sessions were going to be held. All the sessions were held in the same room for the duration of the programme. The researcher also had weekly office hours in the same room, and the participants were encouraged to use the facility when needed. Dyslexic students were also informed that they were going to receive reminders and an outlook calendar invitation for each session on a weekly basis. Dyslexic students completed study skills pre-session "Worksheet-1" to examine the level of their understanding of study skills and effective learning strategies and to further ensure that the all subsequent sessions were planned / modified adequately to address these specific needs.

Worksheet-1 consisted of the following 7 questions:

1. When you hear "study skills" what do you think of?
2. What strategies have you been using (i.e. what things have you been doing) to make sure you study regularly?
3. Do these strategies work for you? Which ones work? When do they work? Which ones don't work? Why do you think they don't work?
4. What additional study or work habits do you need to develop? What do you need to do to develop these skills?
5. What benefits will you gain from developing good study habits?
6. How much time are you willing to invest in developing effective study habits?
7. How will you know you have achieved the skills you need?

Study Skills and Learning Strategies

The study skills workshop was presented over six interactive class sessions and one independent "treasure hunt" session with the aim to help dyslexic students improve their study habits, learn strategies to enhance their academic performance, gain access to the support services and resources available, become more self-aware, achieve their academic goals and become better learners. The purpose of the treasure hunt exercise was to empower and encourage the dyslexic students to familiarise themselves with the type of services and resources available, and to create the opportunity for them to meet the support staff in all the service departments such as Student Affairs, Academic Affairs, Careers Services, "Thinkaid" IT Services Library and Learning Zone.

Components of the study skills and learning strategies:

A) Study Skills: Active learning strategies

This section involved presenting effective strategies for active learning aimed to help guide the students to become in charge of their learning, take responsibility for their education and engage in a process which makes learning interesting and meaningful. Through individual and group exercise, dyslexic students learned various ways to become involved in their education, such as adopting a positive attitude about class content, preparing ahead and reading assignments before class time, asking questions when uncertain during and/or after the lesson, asking a friend who understands the material well, listening actively, reviewing notes regularly, being active and learning from own mistakes. They learned about their preferred learning style - whether they were visual learners, auditory-verbal learners, tactile/kinaesthetic learners. Additionally, the dyslexic students learned how to find interest in their classes, for example getting to know teachers, finding points of interest in assignments, realising the role of learning in life, developing a sense of interest and curiosity about certain aspects of assignments, thinking creatively, having a sense of competition, accepting that anything can be achieved with effective strategies and hard work and realising their own educational and career goals. The “treasure hunt activity” took place on the seventh session, during which the dyslexic students worked in groups and completed the worksheet. They also obtained signatures at each station.

B) Study Skills: Maintaining a positive attitude to maintain motivations

Motivation is the key to success. It has positive effects on study skills, academic performance, adjustment and wellbeing (Vansteenkiste et al, 2009).

Dyslexic students learned about the importance of making sense of what education means to them, explored what motivates them and learned about the power of positive thinking on their performance. They were introduced to different strategies to balance responsibilities, identify and set priorities and potentially save time. Students were guided to explore potential sources of confusion, support services and resources available on campus and at home to assist through these times, and how to access help was thoroughly explained. Student also learned about other variables which could impact academic success such communication skills, interpersonal skills, and social and emotional issues.

Students were introduced to the first three habits Stephen Covey published in his best-selling book, *The Seven Habits for Highly Effective People*. The three habits are a) be proactive, b) begin with the end in mind, and c) put first things first. They learned how to employ these three habits to achieve their academic goals. These concepts were further stressed in the following sections.

C) Time Management

Time management was delivered over four sessions which focused on strategies for managing time and identifying barriers to managing time effectively. During this section four strategies were introduced: setting goals, setting priorities and keeping things in perspective. Dyslexic students learned the significance of asking questions, the best time to ask questions, and how to ask questions to minimise confusion and eventually save time. They were guided through a process of identifying and defining their aims and objectives, achievements, and values they wish to attain. Students learned the process of

setting S.M.A.R.T. goals (specific, measurable, attainable, realistic and timely). The importance of inclusion of both academic and non-academic activities in daily life was discussed. Through the various activities presented in these sessions students became aware of their time management skills, how they used/spent time each and every day, learned how to monitor their time, stop procrastination, plan and predict project completion, make daily/weekly planners, choose preferred study times and places, and how to prioritize tasks and assignments, postpone unnecessary activities and use free time wisely. They practised using some effective time management aids such as creating a simple "to do list", daily/weekly/monthly planner, and long term or annual planner through which they learned to organize their diaries, become punctual, and meet deadlines.

Dyslexic students were reminded about the realities of the university life and the expectations placed upon them which come with being enrolled in higher education. University students are given deadlines which are strict. Marks are usually lost if deadlines are missed without prior arrangements; extensions are only granted for extenuating circumstances. Students must have good reasons to qualify for extensions. All term/semester assignments are identified on the syllabus, reminders may not be given; some assignments/projects may not be completed at the last minute. The importance of shifting their mind-set from dependent learners to independent learners was highlighted throughout these sessions. Students were given some tips to deal successfully with these realities, such as marking all "hand-in" deadlines in the diary at the beginning of the semester, working back from hand-in dates to plan project completion, considering their own learning style when preparing for exams and working on

assignments, being flexible and realistic, blocking study/work time and time for fun and leisure.

Dyslexic students were then given the opportunity to review and analyse three different time management case studies, then were asked to think and reflect on their time management skills through responding to the following three questions:

1. How do you feel about what you do every day?
2. Do you think you use your breaks and free time well? Explain why, or why not?
3. Do you think you need to make changes in the way you spend your breaks/free time? If so, what would you change?

D) Attention and Concentration

Limiting distraction and focusing on the task in hand is the key to increasing concentration. In this session dyslexic students participated in concentration enhancement activity by sitting still in a chair and controlling their involuntary muscle movements. They had to centre their attention on sitting still, monitor their muscle movements and stop all involuntary movements. The students were asked to sit in a relaxed position for five minutes at first, and the duration was extended to ten minutes when they managed to keep perfectly still, and then to 15 minutes.

They were then reminded that effective study habits such as an efficient study schedule, suitable study environment, frequent breaks, planning ahead and being ready for the class is the key to concentration. Dyslexic students learned various effective techniques to enhance their concentration in class and

while studying. For example, eating and sleeping well, self-motivation, and being attentive in class, preparing ahead and being ready for a lecture by reviewing notes, asking questions and being active participant in class discussions, taking notes to limit aggravation before exams, staying away from daydreaming in class or while studying, resisting distraction, being alert and sitting at the front.

E) Organization Skills

This session focused on how to effectively balance educational responsibilities, organise a programme of study and deadlines, while managing social life and maintaining relationships to make the best out of the college life. The importance of self-discipline, being prepared and using time effectively was reinforced through case studies and group exercises. Dyslexic students learned that the best way to organize is to find the tool which works for them. They practised combining short-term and long-term planning processes, made a general plan for the entire semester and a more specific plan for one week at a time. Students learned how to use Microsoft Outlook Calendar for planning and organizing educational, extra-curricular and social activities. Other examples of planners were introduced as daily, weekly, monthly and annual planners, wall planners, planner boards, etc.

Dyslexic students learned some guidelines on how to populate effective personal planners, i.e a) use elements in the syllabi such as term dates, holidays, reading lists, assignment deadlines, internship, and exam dates; b) include social commitments such as a family/friend wedding, special birthdays; and personal commitments such as team practice, a dental appointment, exercise or extra-

curricular activity; c) make provision for exams and project deadlines; and d) make room for “catch up” or contingency plans.

F) Test Taking Strategies

This sessions introduced dyslexic students to effective exam techniques and how to become “good test takers”. The first part of this session was used to reinforce the importance of understanding the time, venue and format of the test to eliminate potential anxiety, and how to adopt effective study habits through individual and group exercises. Dyslexic students learned techniques to prepare effectively and reduce exam stress, such as to know what to study, study manageable sections in advance, organize material for better recall, utilize memorizing techniques, refrain from over studying, adopt self-quiz methods without using books or notes, take frequent breaks, rest well, eat well and sleep well before the exam, arrive early, and be confident.

The second part of the session focused on effective techniques during the exam such as reading questions carefully, understanding and analysing questions before commencing to answer; remaining confident and calm; surveying through the test to determine how to use the time; setting a pace throughout the exam by not spending too much time on one question or carelessly rushing through the entire test; using skip and return technique and eliminating techniques; showing work when working on mathematical concepts; and taking advantage of the allotted time.

G) Memory Skills

In this section the participants were introduced to four strategies to enhance their memory skills; each technique was introduced over a two-hour session. They learned how to use imagination, association, visualisation and the link method to help them to remember and process information. These techniques were introduced and explained during workshop sessions and time for guided and individual practice and implementation was allotted at the end of each session. These techniques and exercises were adopted from the eight times world memory champion Dominic O'Brien's book "How to Pass Exams" (2007).

H) Overview of all the offerings and conclusion

The final and the concluding session offered an overview of the concepts introduced and material covered over the 21 weeks. The participants were guided to reflect on their experience, what they had learned, how they had utilized the skills learned and what difference it had made in their personal and academic life. The participants were also briefed on the final stage of the programme, completed the post-intervention student self-assessment questionnaire, and each one received an appointment for completing the final part of their participation in the study; the administration of A-DAST dyslexia indicator subtests (passage reading, two minute spelling, nonsense passage reading, backwards digit span, and phonemic segmentation) which took place on week 23 (19th May 2010).

- **Building self-awareness: Student self-assessment and teacher-assessment questionnaires** (Appendix C & Appendix D).

Student self-assessment and teacher-student assessment questionnaires were constructed with the aim of identifying the extent of development or improvement in the participants' skills after following the intervention and support programme over 22 weeks. It was decided to construct two questionnaires to examine participants' skills from the point of view of both students and their teachers before and after their participation in the intervention.

Following the development of the intervention programme, a focus group made up of two English faculty, two Maths faculty, two counsellors and a student services supervisor reviewed the intervention programme and discussed possible ways of assessing the development of the participants' study skills from the focus group's point of view. The focus group initially identified six themes which were covered in the intervention programme through which participants' skill development could be assessed. The identified themes were time management, concentration, learning strategies, test taking, organisation skills, and motivation. Then the English teachers identified two additional skills which are taught through English lessons as skill development can be easily evaluated and monitored, reading and writing techniques which are crucial for dyslexic students. Additionally, teachers indicated that progress and skill development in these two areas can be assessed through the main learning outcomes identified on the assessment rubric. Teachers shared the assessment rubric with the researcher and the same was used to formulate questions for reading and writing techniques. The same concept was used to constructs questions for the rest of the categories.

The proposed draft questionnaire consisted of eight categories listed below:

1. Time management
2. Concentration
3. Learning strategies
4. Test taking strategies
5. Organization skills
6. Motivation
7. Reading techniques
8. Writing techniques

Initially each of the above listed categories consisted of twelve statements as constructed by the researcher. The initial questionnaire items were as shown below:

Time Management:

- I attend my classes and meetings on time
- I complete all my projects and assignments on time
- I use my time efficiently
- I complete my tasks as per the deadline
- I am always in a rush
- I study when I am most alert
- I maintain a weekly study plan
- I always make time for planning
- I meet deadlines in advance
- I always keep a list of priorities
- I have time for social activities
- I avoid procrastination

Concentration:

- I am able to concentrate when studying or working on a task
- I don’t remember what I study
- I have no problem concentrating when I study
- I can remember what I learn
- I practise the material by reciting out loud
- I am easily distracted by my surroundings
- I have a favourite study place
- I study in a quiet place
- My memory is very good for what I am learning
- I can maintain concentration for 20 minutes
- I cannot concentrate during the lessons
- I take too long to study a small amount of material

Learning Strategies

- I write my notes in an organized way
- I write my notes after the lecture
- I concentrate on the discussion while I am taking notes
- I can summarise the main points when I am taking notes
- My notes are clear to understand
- I review my notes after the class
- I use a highlighter to identify important information covered in the lecture
- I compare my notes with the textbook and identify important information
- I underline significant information
- I study with my friends and compare notes

- I prefer to study alone
- I write headings and bullet points when taking notes

Test Taking Strategies

- I feel confidant when I prepare for an exam
- I sleep well before that exam
- I create my own study guide for the exam
- I read and analyse questions before answering them
- I double check my work before handing in the exam paper
- I test myself before the exam
- I arrive ahead of time to the exam room
- I stay calm during the exam
- I ask questions when I am unclear
- I eat well before the exam
- I skip questions when I get stuck and then come back to them
- I quickly survey all the questions before answering

Organization Skills

- I organise my work in a logical manner
- I breakdown my work into manageable chunks
- I organize facts in a systematic way
- I create a weekly study guide
- I have a daily study and leisure schedule
- I use maps and drawings to help remember what I study

- I relate material that I learn in a course to materials in other courses
- I review new concepts several times
- I talk about new concepts with a friend
- I understand the important points when I read
- I always take the correct books and materials to class
- I am aware of what I don't understand

Motivation

- I am able to learn independently
- I am interested in learning more about the course I am taking
- I am able to solve problems by focusing on the main issues
- I am interested in the subjects which I am studying
- I take part in class discussions
- I listen to others effectively
- I enjoy attending lessons
- I cooperate with my classmates
- I always find interest in different aspects of the lesson
- I like to think from a different angle
- I am able to focus for a long time
- I ask question to better understand

Reading Techniques

- I allocate specific time for reading everyday
- I pay attention to the time when completing a reading task
- I understand what I read

- I skim through the chapter before I start reading
- I start with the summary first, then I read the chapter
- I pay attention to the themes presented in the reading
- I focus on the main point when I am reading
- I am satisfied with my comprehension when I am reading
- I take notes as I read
- I am confident with my reading pace
- I look up vocabulary that I don't understand
- I highlight/underline important text when I read

Writing Techniques

- I am able to search and use library resources and publications
- I am able to accurately reference sources used in my writing
- I organize my writing in a systematic and meaningful manner
- I am aware of my audience when I write
- I find it easy to structure my writing in a logical way
- I use headings when I write
- I keep the purpose and the main idea in mind when writing
- I find it easy to express my thoughts and feelings in writing
- I proofread my writing and correct grammatical and spelling errors
- I review my writing and correct errors
- I am comfortable using the library and online resources
- I am aware of different writing styles

The draft questionnaire was reviewed by the same focus group and suggestions were given for improvement. The review resulted in modification of some questions and

elimination of others. The discussion resulted in an agreement to limit the number of questions in each category to 8. The Student Self-assessment questionnaire (Appendix C) was then modified to create Teacher-Student assessment questionnaire (Appendix D). Both questionnaires consist of the same eight categories and each category consists of eight items aimed at evaluating the quality of students' study skills. The closed type of question was used with both students and teachers covering all categories. The following Likert-type scale rating was used to capture the frequency of the participants' observed behaviour on each item listed under each one of the eight categories (Always = 4, usually = 3, sometimes = 2 and never = 1).

8.2.2 Outcome Measures

The following two clusters of outcome measures - measures of academic performance and measures of dyslexia indicator - were identified as a base to examine the effectiveness and appropriateness of the proposed intervention programme for Emirati dyslexic students in higher education.

The first category focused on assessing dyslexic students' academic performance pre- and post-intervention through the student self-assessment questionnaire, teacher-student assessment questionnaire, and students' academic progress reports in Maths and English. Through these indicators the dyslexic students' study skills and academic performance were assessed to identify the extent of development which resulted after participating in the intervention programme.

A. Academic Performance

1. Student Self-Assessment of study skills
2. Teacher-student Assessment
3. Academic progress report (English and Maths grades)

The second cluster of outcome measures as indicated below is the dyslexia indicator measures. These measures are the 5 subtests of A-DAST which have diagnostic facets. Detailed explanation of the following subtests was presented in chapter 5. These diagnostic subtests were chosen as they cover the range of skills which tend to be affected in dyslexic individuals. These subtests also provide a profile and the range of difficulties which can be used to understand the causes of attainment difficulties and also indication of the specific skills which require development and support.

B. Dyslexia Indicator Measures (A-DAST Subtests):

1. Passage Reading to measure accuracy, speed and comprehension
    - **Reading Passage 1**
    - **Reading Passage 2**
2. Spelling: 2 minute spelling test
3. Nonsense Passage Reading:
4. Backwards digit Span
5. Phonemic Segmentation

8.2.3 Ethical Consideration

As highlighted in the methodology section in Chapter Five, approval was obtained for all the studies presented in the research from all concerned parties. All relevant ethical

issues were considered. In accordance with ethical guidelines at the University, HCT and the Ministry, informed consent was obtained from the colleges and from the participants (teachers and students). The right to withdraw from the study at any stage was made clear. Participants were assured that their participation and personal information would be kept confidential at all times. To the best of my knowledge, this study did not cause harm to participants. However, the participants were informed that they could contact the researcher for appropriate advice and intervention, if deemed necessary.

8.2.4 Participants

Thirteen students from the Higher Colleges of Technology students from both Diploma and Higher Diploma programmes who participated in the second study and scored 90 or less in seven or more subtests were considered to be "at risk students" and were invited to participate in the intervention programme. All the potential participants were encouraged to participate in this programme. Initially, all thirteen students agreed to participate; however, six students withdrew from the college at different stages during the semester for varying reasons such as marriage, health related issues and family obligations. Consequently, they were eliminated from this study. The remaining seven students committed fully to the study for its duration. The data and the results highlighted in this study are only relevant to the seven students who fully participated throughout the support and intervention programme.

These seven students identified as 'at risk" are referred to throughout this part of the study as dyslexic students or student participants interchangeably.

A control group was not included in this study due to the limited number of subjects who were qualified to take part. As highlighted above, following the administration of A-DAST, only thirteen students had the characteristics of dyslexia and

were eligible to be considered for the intervention programme. Considering the possible attrition rate, if the thirteen participants were divided into experimental and control groups, appropriate analysis would be challenging if there was attrition from either group. Therefore, since this study was an assessment for support, it was decided to include all thirteen in the intervention study.

8.2.5 Procedure

Dyslexic students and teachers were informed about the study. Student participants completed a consent form to indicate their participation in the study and permission to access their academic records. However, they were reminded about their consent and that their participation was entirely voluntary, and the right to withdraw was made clear. They were also assured that the data obtained as a result of this study would be kept confidential, reporting would be in groups, and their participation in this study would not jeopardize their education in HCT colleges. Dyslexic students were promised that all the intervention sessions, questionnaire administration and A-DAST administration would be planned outside their class times.

Teachers were asked to complete a consent form indicating their agreement to taking part in this study. They were informed that their participation would involve providing academic reports on all the dyslexic participants as well as adjusting their course outline and presentation of the material during the lessons to suite dyslexic students' speed of learning. Participants were briefed on the procedure and their involvement in the study.

Students participated in the intervention programme over two semesters. Their academic performance was monitored and progress assessed after the second semester.

The purpose of this process was to examine the suitability and the appropriateness of this programme and to identify areas requiring further attention and development.

8.2.6 Stages of the Intervention Study

First Stage: **Pre- Intervention**

All the participants completed self-assessment reports and the teachers completed a teacher-student assessment questionnaire for each student participant. Week 9 Academic diagnostic results were also obtained for both courses, English and Maths. Participants' scores on A-DAST dyslexia indicator subtests were obtained from the normative data collected for the first study. During the same session all the participants were given a timetable indicating the timing of all the workshops, the training sessions on time management, study skills, memory exercises, self-assessment questionnaire and Dyslexia indicator administration sessions. Participants also received an Outlook Calendar meeting invitation as a reminder prior to each session. These sessions were planned outside class time to ensure that they did not conflict with students' studies.

Second Stage: **Intervention**

Dyslexic students participated in an intervention and support programme over two semesters. Participants attended pre-planned workshops/training once a week for two hours over that period. Each academic semester in the HCT consists of 16 instructional weeks. To ensure that an accurate measure of students' academic performance was obtained, the intervention programme commenced after Week 9 once the diagnostics were completed and students' grades in English and Maths were finalised. Since the

programme commenced on Week 11 of the first semester, each of the seven dyslexic students participated in the intervention programme for a total of 44 hours over 22 weeks. The researcher herself carried out all the 22 intervention sessions focused on self-awareness, improving study skills and learning strategies, time management and memory, including the students' and faculty debriefing sessions, and administered the self-assessments and A-DAST dyslexia indicator measures. During this stage the academic performance of the dyslexic participants was monitored and progress assessed. Since students in Diploma Foundation and Higher Diploma Foundation only study two courses, Maths and English, their grades in both subjects were monitored. In addition, participants completed study skills self-assessment and teachers completed teacher-student assessments to evaluate the quality of students' study skills before the first intervention session. Table 8.1 presented in the earlier section provides a brief outline of the stages and components of the intervention programme, the sessions offered, and the duration of each session.

Third Stage: **Post- Intervention**

A-DAST subtests identified as dyslexia indicator measures as well as the academic performance measures were administered with the seven participants in this study to explore whether their scores on the self-assessment, teacher-student assessment, English and Math grades, as well as their scores on A-DAST subtests showed any improvement after the intervention programme. The academic performance measures and the A-DAST subtests administered were:

- Passage Reading (PR)
- Spelling: 2 minute spelling test (2MS)
- Nonsense Passage Reading (NPR)
- Backwards digit Span (BS)

- Phonemic Segmentation (P.Seg)
- Student Self-Assessment of study skills
- Teacher-Student Assessment of study skills
- Academic Performance (Grades in Math and English)

8.2.6 Results and Analysis

8.2.6.1 Academic Performance

Academic reports submitted by the teachers included the actual grades of the participants in two courses or subject areas (English and Maths). These grades represent students' scores in English and Maths diagnostic assessments pre-intervention and post-intervention. Academic performance was calculated in terms of percentage (%) of improvement in students' grades following their participation in the intervention study.

Table 8.2 and Table 8.3 below show that there was significant improvement in the post-intervention grades in both courses (English and Maths). This highlights that grades of dyslexic students in English and Maths improved significantly after their participation in the intervention study. Percentage of improvement in participants' performance in English varied from 8.30% to 27.50%, and percentage of improvement in Maths from 16% to 25%.

Table 8.2: HCT Dyslexic Students' Pre-intervention & Post-intervention Grades in English

Pre-intervention grades	52.5	61	59	64	66	62	63
Post-intervention grades	67	73	68	75	71.5	79	70
Improvement Percentage	27.50%	19.70%	15.30%	17.20%	8.30%	27.40%	11%

Table 8.3: Dyslexic Students' Pre-intervention & Post-intervention Grades in Maths

Pre- intervention grades	63	62	65	60	67	66	69
Post- intervention grades	75	74	77	75	79.5	78	80
Improvement Percentage	19.00%	19.40%	18.50%	25.00%	18.70%	18.20%	16%

8.2.6.2 Students' Study Skills

8.2.6.2.1 Descriptive Statistics

In Tables 8.4 & 8.5 of descriptive statistics presented below, it is clear that the dyslexic students' scores on the study skills questionnaire showed an improvement, as shown in the means of each category pre-intervention and post-intervention obtained from the responses of both students' self-assessment and teachers' assessment. Responses from students and teachers generally showed consensus in all eight categories. However, students noted a bigger improvement in concentration and memory (M=51.7) than the teachers (M=26.8), while the teachers noted a bigger improvement in writing (M=25.7) than the students (M=22.4)

Table 8.4: Descriptive Statistics (students' responses on study skills questionnaire)

Descriptive Statistics

	Mean	Std. Deviation	N
Time Management Pre	16.29	1.254	7
Concentration and Memory Pre	30.57	1.988	7
Study Skills and Note taking Pre	14.43	1.813	7
Test strategy and Anxiety Pre	17.0000	1.41421	7
Organise and Process Info Pre	15.1429	1.67616	7
Motivation and Attitude Pre	16.5714	1.51186	7
Reading Pre	14.7143	1.25357	7
Writing Pre	15.4286	1.27242	7
Time Management Post	27.4286	1.27242	7
Concentration and Memory Post	51.7143	1.60357	7
Study Skills and Note taking Post	27.1429	1.34519	7
Test strategy and Anxiety Post	23.0000	1.91485	7
Organise and Process Info Post	25.4286	2.14920	7
Motivation and Attitude Post	27.1429	1.46385	7
Reading Post	26.2857	1.79947	7
Writing Post	22.4286	2.14920	7

Table 8.5: Descriptive Statistics (teachers' responses on study skills questionnaire)

Descriptive Statistics

	Mean	Std. Deviation	N
Time Management Pre	14.29	1.604	7
Concentration and Memory Pre	15.29	1.380	7
Study Skills and Note taking Pre	14.43	1.813	7
Test strategy and Anxiety Pre	17.0000	1.73205	7
Organise and Process Info Pre	15.1429	1.67616	7
Motivation and Attitude Pre	16.5714	1.51186	7
Reading Pre	14.7143	1.25357	7
Writing Pre	15.2857	1.38013	7
Time Management Post	27.1429	1.06904	7
Concentration and Memory Post	26.8571	1.06904	7
Study Skills and Note taking Post	26.8571	1.06904	7
Test strategy and Anxiety Post	23.5714	1.51186	7
Organise and Process Info Post	26.5714	1.51186	7
Motivation and Attitude Post	27.2857	1.38013	7
Reading Post	26.5714	1.51186	7
Writing Post	25.7143	.95119	7

8.2.6.2.2 General Linear (GLM)

Repeated Measures analysis of variance was applied to dyslexic students' and teachers' responses on the study skills questionnaire to assess the impact of the proposed intervention programme on participants' academic performance over time from both students' and teachers' points of view.

Repeated Measures analysis of dyslexic students' self-assessment and teacher assessment yielded a statistically significant effect for time across the two time periods (pre-intervention and post-intervention).

As clear in Tables 8.6 & 8.7 below, substantial main effect for time was observed from students' responses, Wilks Lambda = .006, F (1, 6) = 1041.7, P< .0005, partial eta square = .994. Using the guidelines proposed by Cohen (1988, pp. 284-7) .994 is a very large effect.

Teachers' responses also revealed significant main effect for time, Wilks Lambda = .001, F (1, 6) = 8343.2, p < .0005, partial eta square = .999 (a very large effect). In addition, considerable improvement was observed in students' grades and their performance on dyslexia indicator sub-tests.

Table 8.6: Multivariate Tests (students' responses)

Multivariate Tests[c]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
time	Pillai's Trace	.994	1041.653[a]	1.000	6.000	.000	.994
	Wilks' Lambda	.006	1041.653[a]	1.000	6.000	.000	.994
	Hotelling's Trace	173.609	1041.653[a]	1.000	6.000	.000	.994
	Roy's Largest Root	173.609	1041.653[a]	1.000	6.000	.000	.994
test	Pillai's Trace	.[b]	.	.	.	.	.
	Wilks' Lambda	.[b]	.	.	.	.	.
	Hotelling's Trace	.[b]	.	.	.	.	.
	Roy's Largest Root	.[b]	.	.	.	.	.
time * test	Pillai's Trace	.[b]	.	.	.	.	.
	Wilks' Lambda	.[b]	.	.	.	.	.
	Hotelling's Trace	.[b]	.	.	.	.	.
	Roy's Largest Root	.[b]	.	.	.	.	.

a. Exact statistic

b. Cannot produce multivariate test statistics because of insufficient residual degrees of freedom.

c.
Design: Intercept
Within Subjects Design: time+test+time*test

Table 8.7: Multivariate Tests (teachers' responses)

Multivariate Tests[c]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Time	Pillai's Trace	.999	8343.199[a]	1.000	6.000	.000	.999
	Wilks' Lambda	.001	8343.199[a]	1.000	6.000	.000	.999
	Hotelling's Trace	1390.533	8343.199[a]	1.000	6.000	.000	.999
	Roy's Largest Root	1390.533	8343.199[a]	1.000	6.000	.000	.999
Test	Pillai's Trace	.[b]	.	.	.	.	.
	Wilks' Lambda	.[b]	.	.	.	.	.
	Hotelling's Trace	.[b]	.	.	.	.	.
	Roy's Largest Root	.[b]	.	.	.	.	.
Time * Test	Pillai's Trace	.[b]	.	.	.	.	.
	Wilks' Lambda	.[b]	.	.	.	.	.
	Hotelling's Trace	.[b]	.	.	.	.	.
	Roy's Largest Root	.[b]	.	.	.	.	.

a. Exact statistic

b. Cannot produce multivariate test statistics because of insufficient residual degrees of freedom.

c.
Design: Intercept
Within Subjects Design: Time+Test+Time*Test

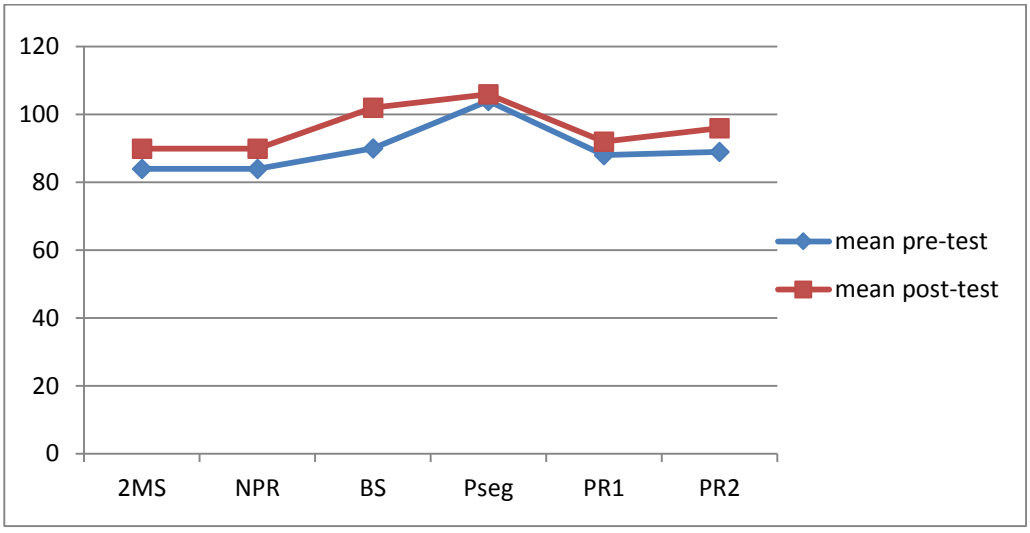
8.2.6.3 Dyslexia Indicator Measures

8.2.6.3.1 Descriptive Statistics

Using descriptive statistics, means of the sub-tests of dyslexia indicator measures (PR, 2MS, NPR, BS, PSeg) were calculated. The means and standard deviations were calculated for this cohort and these were used to develop standardized scores with a mean

(m) of 100 and standard deviation (sd) of 15. Figure 4 below shows that participants' scores improved on each of the sub-tests of dyslexia indicator measures. Improvement was less in phonemic segmentation (PSeg) and Backwards digit span (BS).

Figure 8.1: A-DAST (pre-test & post-test) dyslexia indicator sub-test means for HCT dyslexic students



8.2.6.4 Discussion

Findings in the section indicate that Emirati students with dyslexia were able to improve their academic performance in English and Maths after their participation in the intervention programme over two semesters (a period of eight months). The two academic performance measures identified (grades and study skills) proved to be robust indicators. The assessment of participants' study skills before the implementation of the intervention increased students' self-awareness and motivated them to participate actively in the

intervention programme. It also helped the participants identify their weaknesses and gaps in their study skills, learning strategies, and memory, which in turn assisted them in developing appropriate plans for improvement. With improvements in self-awareness and learning strategies, students were able to devise their own study plans and achieve their academic goals.

Therefore, it can be argued that the outcome measures positively influenced the success of the intervention programme, as through this basic assessment tool students with dyslexia were able to understand factors impeding their academic performance and thus were able overcome them and become better learners. This also helped the intervention session become more interactive as the participants had some degree of awareness of the specific skills or issues they needed to address and improve.

Metacognitive awareness skills of people with dyslexia are deficient; therefore structured training in effective learning strategies is essential to show them the most efficient ways to learn (Reid & Kirk, 2001). The intervention and support programme proposed in this study focused on assisting students with dyslexia to develop self-awareness, improve their learning strategies and memory, and take charge of their own learning. This was achieved through training Emirati students with dyslexia in evaluating and improving their study skills, time management, acquiring self-assessment skills, and memory improving exercises. This type of intervention technique encouraged the participants to develop autonomy and take charge of their own learning, make decisions to identify and plan their own individual success model, work towards their personal academic goals, and evaluate their success. Consequently, students with dyslexia who participated in this study became better learners as they became more aware of their own abilities to learn in addition to improving their literacy skills; Mackie (1996) supports this finding.

Findings of this study confirm that the success of such an intervention and support programme is due to its ability to address the needs of students with dyslexia effectively. The support programme enabled the students with dyslexia to acquire the necessary skills and competencies which led them to develop autonomy, self-direction, and self-assessment. This in turn enabled them to enhance their skills of metacognition and assume more control over their own academic plans and outcomes, as well as giving them the freedom to develop their own success model.

None of the intervention material presented was directed towards phonological development; however, the results of the dyslexia indicator measures show that students improved on all indicators, especially phonemic segmentation and backwards digit span. This implies that self-awareness coupled with effective learning strategies, access to support services and counselling have an impact on learning improvement in other areas.

CHAPTER 9

Discussion and Conclusion

9.1 Introduction

This general discussion chapter aims to provide an overview of the main findings of the three research studies conducted as a part of this PhD project: i) Translation and adaptation of the Dyslexia Adult Screening Test for the Arabic language A-DAST; ii) Assessment of counselling and support needs of Emirati dyslexics; and iii) Intervention and support programme for Emirati dyslexic students. This section also provides discussion of the importance of the findings in terms of contribution to the field of learning disability and dyslexia, as well as contribution to the immediate beneficiary, the HCT. Finally, limitations of the current study and difficulties encountered are presented, followed by recommendations for future research.

9.2 Summary of Findings

General Overview:

The analysis of the results discussed throughout this thesis indicates significant findings with regard to the common features of developmental dyslexia in general and the specific manifestation of developmental dyslexia in the Arabic language. Discussions in this section are presented in the light of the theories and definition of developmental dyslexia debated in detail in Chapter Two, the nature and characteristics of Arabic orthography presented in Chapter Three, and the research questions and hypothesises. The main study resulted in identifying a Emirati dyslexic population in higher education. Those identified as dyslexics are the ones who meet the selection criteria, i.e. a score of 90 or less on at least 7 A-DAST subtests, strictly including low scores on literacy attainment (reading and spelling), and an average score on nonverbal reasoning. This selection was according to the theoretical understanding of developmental dyslexia and the widely accepted definition of dyslexia as discussed in detail in the second chapter, which is disorder is reading and writing acquisition despite adequate tuition and normal intelligence and in the absence of neurological and psychological conditions (British Dyslexia Association (BDA), 2005).

Thirteen participants out of 280 participants met this criterion and were identified as dyslexics. They made 4.6% of the total participants. The occurrence of dyslexia in the UAE is found to be relatively consistent with incidence of dyslexia reported in the UK (Singleton, 1999; Singleton & Aisbit, 2001). Amongst the dyslexic group there were 8 male dyslexics and 5 female dyslexics, the ratio of female:male is 1:1.6. A similar finding was reported in a study by Singleton (1999). Haslum and Wheeler (1998) reported a ratio of 1:1.7. The ratio of female:male incidence of dyslexia in school population seems to be higher according to Miles (1999), who reported a ratio of 1:4.5. Similarly, Shaywitz et al.'s (1999) reports show a comparable ratio for school population. Singleton (1999) and

Miles et al. (1998) argue that the lower female:male ratio of dyslexia is attributable to the fact that female dyslexics develop better compensatory strategies and hence have a better chance of enrolling in higher education, while male dyslexics tend be more severely affected. However, Shaywitz, Shaywitz, Fletcher & Escobar (1990) point out that gender difference in the prevalence of dyslexia in school age children may be attributed to the fact that more boys are referred for learning disabilities assessment than girls.

It is notable that 5.7% of the participants had a low score (90 or below) on both attainment and phonological tests. While the selection criteria as indicated earlier were based on attainment and nonverbal reasoning tests, results support the initial hypothesis that phonological deficit is associated with literacy acquisition and is a predictor of dyslexia in Arabic. Abu Rabia's (2004) also found that Arabic dyslexics showed poor phonological decoding skills when compared with readers of the same age and reading levels.

High scores on the one minute reading test were noted, that is, "reading single words from a list". However, inconsistencies were clear when compared with scores on the two passage reading tests (scores were high on reading the passage with diacritics and scores were low on reading the passage without diacritics). This initial discrepancy in reading level can be attributed to the irregular nature of Arabic orthography, as discussed in Chapter Three. Arabic language in its original form during early years of education is regarded as a shallow orthography due to the presence of diacritics or vowelized text. This feature of the Arabic language and the clear phoneme-grapheme relationship makes phonemic awareness accessible even for dyslexics to develop (Elbeheri, 2004). These results converge with the conclusions of Mutter, 2003; Everatt & Elbeheri, 2009; Everatt et al, 2002; and Veii & Everatt, 2005, that readers of highly transparent orthographies such as Arabic develop phoneme-grapheme decoding skills more quickly than readers of

opaque orthographies. These findings explain the reasons for Arabic dyslexics scoring higher on the reading accuracy test, while the same group score lower on other measures of literacy such as un-vowelized passage reading. It is only in some unique situations that Arabic is regarded as deep orthography. For instance, the phonological distance between the classic/modern Arabic taught at school and the spoken Arabic used every day in varying settings, and presence of the vowels or diacritic marks in early reading and their absence in advanced reading and newspapers, magazines, road signs, etc. add to the complexity of the Arabic language and positions it as deep orthography. Therefore, the diaglossia feature of Arabic orthography is seen to impact reading skills (Elbeheri et al., 2009) and the morphological nature of Arabic is also predictive of reading accuracy and comprehension (Abu Rabia, 2007; cited in Elbeheri et al., 2009).

Therefore, reading single words from a list fails to provide a clear indication of deficit. A true indication of reading speed and accuracy can be achieved through sentence reading, as through sentence and paragraph reading one needs to depend on knowledge of grammatical rules and sentence structure. Also there are words in Arabic with different meanings: the correct meaning can be elicited from its position in a sentence. Comprehension is also dependent upon accurate reading. Therefore, passage reading provides a better indication of reading deficit in Arabic.

Adequate knowledge of Arabic orthography is essential for the acquisition of reading and writing, consequently deficits in orthographic processing lead to impaired reading and writing skills amongst Arabic dyslexics. Visual features of the Arabic alphabets are another feature of Arabic orthography which confront dyslexics with a huge challenge. The 28 letters share four basic shapes and are distinguished only by the presence, absence, number and place of the dots. These present complexity in phoneme-grapheme relations as the words are made of joint letters and the shape of a character

changes depending on its position in a word. This complex feature of Arabic orthography poses additional challenges to dyslexics' reading and writing acquisition.

The low scores of dyslexic students on nonsense passage reading support the relevance of phonological processing in predicting dyslexia amongst speakers of Arabic. Additional support for a phonological deficit hypothesis is the presence of homographs which pose a challenge to poor readers (Abu Rabia, 2007; Everatt & Elbeheri, 2009).

Correct reading of non-words requires sophisticated phonological awareness as well as the ability to break down un-vowelized non-words into chunks that can then be articulated (Abu Rabia, 2003; Cooke, 2002). According to Singleton (2000) the best way of assessing individuals' decoding skills is by asking them to read words they have not encountered before, or unfamiliar words (Aaron, 1994). Relying on the textual context in word prediction and comprehension when reading non-words makes accurate reading an impossible task for poor readers, as correct reading in this context is highly dependent upon understanding of letter-sounds and grammatical cues as well as understanding "grapheme-phoneme transcription and then a blending of the resulting sound" (Farmer et. al, 2002: 17). Frith (2002) states that poor non-word reading is indication of lack of competence in the alphabetic strategy and dyslexics may have problems in acquiring this strategy which facilitates access to "word's meaning as quickly as word's sound" (Frith, 2002:52).

Dyslexic participants also scored low on backward digit span; low scores here indicate impairment in verbal short term memory which in turn negatively affects spelling and reading skills (Goswami & Bryant, 1990). Therefore, backward digit span is a good indicator of dyslexia in Arabic.

The scores of dyslexic students on postural stability were worse than the scores of non-dyslexics; this confirms difficulties in maintaining balance especially when concentration is not focused on the balancing task itself (Fawcett & Nicolson, 1990). According to the cerebellar deficit hypothesis, difficulties in postural stability are considered to reflect abnormalities in the cerebellum which is responsible for prediction of muscular outcome and smooth movement, postural maintenance, visually guided movements and sensory information integration, motor skills and automatization.

Dyslexic students had difficulty with the one-minute writing test, an exercise which involves simple copying of a short sentence to measure speed of writing independent of the need to think. The handwriting of most of the participants was difficult to read and untidy. The handwriting, speed and accuracy of two minutes spelling was poor amongst dyslexic students. Poor handwriting and the inability to complete the writing task is considered a deficiency in motor skills which can be caused by cerebellar deficit leading to inability to achieve automatization (Nicolson & Fawcett, 1990). These findings support the initial expectation that cerebellar and phonological deficit are a predictor of dyslexia in Arabic.

Observing the dyslexic participants in the intervention study, it was realized that some of them were clumsy, had difficulty copying simple information from the board, their handwriting was unreadable (some of them to the extent that they could not recognize their own writing), and they had difficulty organizing their ideas in a sequence. These characteristics could be attributed to cerebellar deficits (Nicolson & Fawcett, 1990); however, further sophisticated research is required to fully examine this interpretation.

Discussions of the findings of the first study presented above confirm that dyslexia is not language independent, its manifestations are language specific (Smythe et al., 2004). These findings strongly endorse the need for a culturally-appropriate diagnostic test for dyslexia in Arabic. In addition they confirm that adequate counselling and support services which focus on individual needs are the key to success for dyslexics.

In order to support the dyslexic learners it is crucial to understand their experience and identify their needs (Mortimore & Crozier, 2006). Therefore identification of the needs of dyslexic students and the adequacy of counselling services was the principle aim of the second study. The findings from the second study highlight the inadequacy of the current counselling framework and the social, emotional and academic difficulties of dyslexic students, substantiating the need for a more specific support programme for dyslexic Emirati students. The need for support mechanisms to help dyslexics in pursuit of their goals is paramount to their success in the higher education (Fuller et al., 2004).

Dyslexic students enrolled in Diploma and Higher Diploma Foundation programmes reported weak academic (learning and study skills) and non-academic skills. The difficulties reported by the dyslexic students are marked in the areas of note taking, expressing ideas in writing, note taking, accessing support resources, organising work, understanding exam procedures, and learning from lectures. These academic problems can impact self-esteem and self-confidence, especially when written work is criticized for poor presentation, grammar, spelling and punctuation (Kavale & Forness, 1996) which in turn has a negative impact on dyslexic students (Gibson & kendall, 2011; Pollak, 2009; Riddick, 2010). Dyslexic students report feelings of inferiority (Macloughlin et al., 1994) and anxiety about assessments (Fuller et al., 2004).Thus dyslexic students have specific needs for support on academic, social, personal and emotional levels. They require

training in basic college knowhow, study skills, learning strategies, self-awareness and self-advocacy (Hatcher et al, 2004).

Counselling and support services in HCT were found to be very limited and failed to address the needs of individual students. Both dyslexic and non-dyslexic students realize the inadequacy of support services in HCT in terms of number, qualifications and experience of counselling staff and type of services provided. On average each campus in the HCT has over 2000 students and 2 counsellors. This is an inadequate number and makes it challenging for the counsellors to address individual needs; therefore they tend to focus on common group needs and allow very limited time for individual issues.

Over 90% of the counselling staff in the HCT are expatriates. They come with a vast knowledge of different counselling approaches and techniques, but they lack knowledge of the UAE population. They lack basic knowledge of the culture and religion, and sometimes even appropriate and inappropriate views, discussions, gestures etc. Language is also a major barrier in this relationship. Thorne (1983) and Covington (1992) propose that a professionally equipped person should be available to be approached by students who are feeling anxious, stressed, unhappy, and who suffer from low self-esteem, to explore their difficulties and provide appropriate support. Thus, as highlighted in Chapters Two and Seven, it is imperative that counsellors are equipped with "specialised" knowledge about dyslexia, its manifestations, policies and legislation, and appropriate interventions; as well as a good understanding of the dyslexic students' language and religious and cultural background, to be able to assist dyslexic students. The counsellors must adopt the Islamic morale which has been proposed by the Western psychologists also, and that becomes apparent in demonstrating genuineness, empathy, acceptance, positive regard and courteousness (Carkhuff, 1967; James, 1979; Rogers, 1979).

Dyslexic students reported that their difficulties were not addressed and their needs were not met. The feeling of being understood plays a key role in accepting literacy difficulties and taking the necessary steps towards developing compensatory skills (Burden, 2005). In the HCT, the language barrier seems to be one of the leading causes which impedes upon the success of the counselling services. The counselling process, or "talking therapy" as it is sometimes referred to, relies considerably on the process of talking and listening. Communication is fundamental to the success of the therapeutic process. A major predicament arises when the counsellor and the client have different linguistic origins (Sue et al., 1992). Lago and Thompson (1996) argue that misunderstanding may lead to anger, frustration, and even hatred, when language barriers influence the effectiveness of communication and the interview process. Intense emotions, feelings, thoughts and even experiences may be misinterpreted in the process of translation or language difficulties.

A clear framework and guidelines for counselling were reported to be lacking. From exposure to the HCT support services, I realise that the counsellors are involved in many different non-counselling tasks; the amount and variation of tasks differs in each college and each Emirate. Different campuses have different expectations and different views of what counselling is. These tasks range from monitoring attendance, disciplinary issues, academic honesty, health issues, and organizing events and conferences; some are even involved in teaching.

For the HCT to be able to address the unique needs of its students on different levels, the current services must be fully examined and a new and comprehensive framework for counselling needs to be developed. This framework should consider general needs of all its students and the specific needs of dyslexic students and background, and must employ an holistic support and development approach. A clear job

description for counsellors is essential. Clear policy statement and appropriate professional guidelines are crucial.

Based on the findings from the second study, interviews and literature review, an intervention and support programme was developed and piloted with a group of seven Emirati students with dyslexia. This programme focused on skill building, self-awareness and self-evaluation which aimed at "personal empowerment" (Hunter-Carsch & Herrington, 2001). Enhanced performance on academic and non-academic aspects was noted post participation in the intervention programme. Performance improvement as a result of improvement in learning strategies conforms with the findings of the Conscious Compensation hypothesis by Nicolson and Fawcett (1990).

The intervention and support programme was developed with the aim of addressing the unique needs of dyslexic Emirati students. The programme offered training in learning strategies, study skills and time management, self-awareness and self-evaluation. The pilot programme yielded positive outcomes. Improvements resulted in both academic and non-academic skills of the dyslexic students. Dyslexic students were able to enhance their learning strategies, study skills, time management and self-evaluation during the intervention and support pilot study. They also practised these skills on multiple occasions to find out the best environment, the best strategy and the best plan for themselves. Individual students realized their unique needs for support. Some required more practice time to acquire the skill; others needed to be exposed only once. According to the quantitative results obtained, the intervention and support programme achieved the objective of the study.

However, the results of this study are only tentative due to the relatively small sample size. This study needs to be replicated with a larger cohort to ascertain a final

conclusion. Nevertheless, a huge body of research presents that intervention and support programmes yield positive outcomes when carefully developed to address the needs of a specific group (Mortimire & Crozier, 2006; Pollak, 2009; Pavey et al 2010; Riddick, 2003). Additionally, self-evaluation, self-awareness and skill development lead to conscious and continuous self-monitoring and therefore compensate for deficiencies to achieve success.

9.3 Reflection on Importance of Findings:

This current study is the first step towards understanding learning disabilities and developmental dyslexia in Arabic in Higher Education in the United Arab Emirates. Results achieved from the present investigation make a contribution to the limited pool of research available on developmental dyslexia and learning disabilities in the Arabic language. It is hoped that the findings will close some of the existing gaps. It is also a major contribution towards raising awareness amongst students and faculty as well as in the general public. It is hoped that this awareness will generate further research interest in this challenging field.

The significance of the findings of this research is on three levels a) development and validation of a culturally-appropriate diagnostic assessment for determining dyslexia in higher education in the UAE, b) identification of limitations of support services for dyslexic students in higher education in the UAE, and c) development of a substantial intervention programme to support students with dyslexia in higher education in the UAE.

The Arabic Dyslexia Adult Screening Test (A-DAST), which makes culturally-appropriate diagnosis of dyslexia in higher education in the UAE possible, was developed and validated. The A-DAST is a valuable contribution to Arabic literature on learning disabilities and dyslexia. A-DAST is relatively easy to administer; it is hoped that practitioners can either use it as a screening tool or utilize it to establish a basis for further investigation. This study has raised awareness among faculty and students in the HCT. Many of the teaching faculty have referred students from different campuses around the Emirates for screening, and students have self-referred. Parents from the community have also started referring their children for dyslexia assessment.

This study resulted in the development and validation of A-DAST, the only diagnostic method currently available to provide a culturally-appropriate test for dyslexia in UAE higher education. This development resulted in a major advancement in academic policies and accommodations for learning disabilities in the HCT. Learning disabilities have received acceptance by policy makers in the HCT. A policy statement was established by the registrar's office, highlighting guidelines for the application process, appropriate accommodations and support.

The results of this study received interest from the media and consequently two newspaper articles were published based on an interview with the researcher. This in turn had some effects on raising awareness amongst the general public about dyslexia and its manifestations in the Arabic language. Following the newspaper publication people from the general public started approaching the researcher for information about developmental dyslexia and assessment.

The second study identified the limitations of the support services for Emirati students with dyslexia, another contribution which has had a positive impact.

Highlighting these limitations supported the establishment of the "Success Centre" which was established with the objective of offering the following services:

1. Awareness

2. Intervention & support

Stages of Intervention:

- Induction: preparation for college life;
- Diagnosis and Support: early detection of learning disabilities and offer of appropriate remediation (academic, social and psychological; learning strategies, self-advocacy, assistive technology);
- Graduation and Employment: preparation for the next stage and continuous support after graduation.

4. **On-going Research:** Through this centre, HCT Dubai is currently working on a major research project with AQR on Mental Toughness, the MTQ48 questionnaire.

The specifically-developed intervention and support programme proved to be appropriate in terms of addressing the needs of Emirati students with dyslexia. All the students who participated in the pilot programme have improved both academically and personally. As a result, the same intervention programme is currently being administered through the Student Success Centres. It continues to make a difference in the lives of many Emiratis.

9.4 Research Limitations

Even though this PhD study accomplished its main aim of devising a culturally-appropriate framework for intervention and support for dyslexic Emirati students in higher education, as well as its secondary objective of devising an appropriate diagnostic assessment for dyslexia in Arabic which takes into consideration the culture and the language of college level Emirati dyslexic students, one of the major limitations of this research is the low number of participants in the third study: Intervention and Support Programme for Emirati Dyslexic Students. Thirteen students from the Higher Colleges of Technology from both Diploma and Higher Diploma programmes out of a total of 280 students who participated in the first study "Translation and adaptation of the Dyslexia Adult Screening Test for the Arabic Language (A-DAST)" and who scored 90 or less on seven or more subtests were identified as dyslexic and invited to participate in the intervention study. Initially all thirteen students agreed to participate in the study; however, six students withdrew from the college at different points during the study for different reasons such as marriage, family obligations and health-related reasons. This left a very limited intervention group with only seven participants who committed to the whole duration of the study. Therefore the results of the third study are necessarily tentative due to this relatively small number of participants.

I planned to collect more data and retest another group of students from the same cohort and repeat the administration of studies one and two to ensure an adequate number of participants in the intervention study. However, work related commitments made it impossible to re-administer these studies. This was due to a) long working hours, b) a huge workload, as currently I manage Student Services, Academic Services, Careers Department, Health and Physical Education and Health Sciences Department, c) lack of finances to employ test administrators: additional testing requires a great deal of travel time to different Emirates due to the geographical location of different HCT campuses.

The current work-related commitments do not allow the flexibility to travel and administer the test and intervention programme. Re-administration is quite costly in terms of funding printing material and test administrators.

Another challenge of this study is the lack of publications, material and references on developmental dyslexia in Arabic. Most of the few available research studies focus on issues related to reading acquisition amongst Arabic speaking children mainly in primary level education, neglecting secondary students and students in higher education. This had a major drawback on the current study; instead of focusing on developing different intervention programmes and examining their effectiveness, then recommending the most suitable one based on the findings, as I had originally hoped, research was directed to devise a culturally suitable assessment for dyslexia in Arabic, targeting adults in higher education to enable identification of a target group who would benefit from such programme. This was because of the lack of publications and references for the population of my interest.

IQ measures or measures of mental abilities are frequently used in dyslexia assessments. This study focused on screening for support and intervention, therefore the nonverbal reasoning subtest was considered adequate for this purpose. Cooke (2002) argues that the nonverbal reasoning test is more appropriate for dyslexics as their poor reading skills put them at a disadvantage. A full IQ measure was not incorporated due to time and resource constraints. A full diagnosis, including measures of IQ, would have been a more effective approach for this context as it would reveal a fuller picture of dyslexia amongst Emirati students in higher education, according to the traditional definition of developmental dyslexia presented in the second chapter. The traditional definition is based on the assumption that there is a direct relationship between an individuals' mental abilities and their academic performance (Doyle, 2002), a notion

which is still widely accepted in the Arab world while under criticism in the west. This is a view which has been reported by the British Dyslexia association to have no theoretical grounds (1999).

This study focused on first year students in Higher Diploma Foundation and Diploma Foundation. This is a remedial pre-bachelors programme. The data obtained is specific to this cohort only and might not apply to students enrolled in bachelor programmes. The inclusion of students from different levels of the bachelor programme could have helped in terms of the number of dyslexic participants, and consequently may have heightened understanding of the manifestation of dyslexia in Arabic and could have provided a greater confidence in explaining the results of the study.

9.5. Directions for Further Study

Throughout this thesis, it has been highlighted that theoretical research studies on dyslexia in Arabic and publications are very rare in the UAE. Culturally-appropriate resources to diagnose and support Emirati students with dyslexia are crucial at this stage. Therefore, recommendations for future studies are on two levels. The first level will address the limitations directly associated with the current study and the second level will attempt to address the deficiency in scientific dyslexia research in the Arabic language in general.

The current study can benefit from improvement in the design. With this participants need to be more representative of the general cohort of "college level students" rather than keeping a focus only on first year students in Higher Diploma and Diploma Foundation programmes. To ensure a broader representation, it would be beneficial to include Emirati students enrolled in different levels of bachelor programmes

in other higher education institutions in Dubai, both private and federally funded, in addition to HCT Dubai. Considering participants from other higher education institutions within Dubai would be cost effective in terms of the cost involved in time and travel to other Emirates. Inclusion of a representative and adequate number of participants would support and strengthen the results and the findings of the study. All students in] higher education in the UAE have access to iPads and laptops, and technical support and expertise for such purposes is readily available within HCT. Another effective method to address the cost would be to explore ways to launch complete e-assessments for dyslexia in Arabic with an IQ component.

The acquisition process of the Arabic language is unique. This uniqueness is attributed to the complexity of the language and its irregular nature of transparency, as discussed in earlier chapters (such as the presence of diacritic marks in early reading and their absence in more advanced texts), and the inconsistencies between spoken and classic Arabic. To construct a better understanding of the manifestation of dyslexia in Arabic, further systematic research investigation of learning disabilities in general and dyslexia in particular is essential. There is a pressing need to develop a complete diagnostic tool. It would be beneficial for the field in the Arab world if efforts were combined to collect norms from all Arabic speaking countries, matched for age and then standardized. The availability of such standardized diagnostic methods would support more effective and focused research in the field.

9.6 Conclusion

In conclusion, both the primary and secondary aims of the research study have been met and supported. This study resulted in identifying a culturally-appropriate diagnostic method for diagnosing dyslexia in UAE higher education through the Dyslexia

Adult Screening Test. Limitations of the counselling and support services in UAE higher education were identified and a culturally-appropriate intervention and support programme was developed and examined.

The findings discussed in the preceding chapters identify manifestations of dyslexia in Arabic and demonstrated support for the notion of similarity in the cognitive profiles of Arabic and English adult dyslexics. Findings also support the theories which consider developmental dyslexia as a global phenomenon which appears with different characteristics and manifestations depending on the specific language and the features of its orthography in addition to the cultural and educational backgrounds of the individuals (Snowling, 2000; Smythe & Everatt, 2000; Nikolopoulos et al. 2004). Findings of this study are also consistent with other studies with relation to the incidences and causes of dyslexia amongst speakers of Arabic and other transparent orthographies. Further studies are necessary to develop more sophisticated measures of dyslexia in Arabic.

References

Abu Rabia, S. (1997a). Reading in Arabic orthography: The effect of vowels and context on reading accuracy of poor and skilled native Arabic readers. *Reading & Writing: An Interdisciplinary Journal*, 9 (1), 65-78.

Abu Rabia, S. (1997b). Reading in Arabic orthography: The effect of vowels and context on reading accuracy of poor and skilled native Arabic readers in reading paragraphs, sentences, and isolated words. *Journal of Psycholinguistic Research*, 26(4), 465-482.

Abu Rabia, S. (1998). Reading Arabic texts: Effects of text type, reader type, and vowelization. *Reading and Writing*, 10(2), 105-119.

Abu Rabia, S. (2001). The role of vowels in reading Semitic scripts: Data from Arabic and Hebrew. *Reading and Writing*, 14(1-2), 39-59.

Abu Rabia, S. (2007). The role of morphology and short vowelization in reading Arabic among normal and dyslexic readers in grades 3, 6, 9, and 12. *Journal of Psycholinguistic Research*, 36, 89-106.

Abu Rabia, S., Share, D. & Mansour, M. (2003). Word recognition and basic cognitive processes among young reading disabled and normal readers in the Arabic language. *Reading and Writing: An Interdisciplinary Journal*, 16, 423-442.

Abu Rabia, S., & Taha, H. (2004). Reading and spelling error analysis of native Arabic dyslexic readers. *Reading and Writing: An Interdisciplinary Journal*, 17, 651-689.

Abu Rabia, S., & Taha, H. (2006). Phonological errors predominate in Arabic spelling across grades 1-9. *Journal of Psycholinguistic Research*, 35, 167-188.

Adlard, A. & Hazan, V. (1998). Speech perception in children with specific reading difficulties (Dyslexia).*The Quarterly Journal of Experimental Psychology*, 51a (1), 153-177.

Ahissar, M., Protopapas, A., Reid, M., & Merzenich, M. (2000). Auditory processing parallels reading abilities in adults. *Proceedings of National Academy of Science of the United States of America*, 97(12), 6832-7.

Albrow, K. (1972). *The English Writing System: Notes Towards a Description*. London: Longman.

Al-Mannai, H. & Everatt, J. (2005). Phonological processing skills as predictors of literacy amongst Arabic speaking Bahraini school children. *Dyslexia*, 11, 269-291.,

Amayreh, M. & Dyson, A. (1998). The acquisition of Arabic consonants. *Journal of Speech, Language and Hearing Research*, 41, 642-653.

Amitay, S. Ben-Yehudah, G., Banai, K. & Ahissar, M., (2002). Disabled readers suffer from visual and auditory impairments but not from specific magnocellular deficit. *Brain*, 125(10), 2272-85.

Annett, M. (1985). *Left, right, hand and brain: The right shift theory*. London: Lawrence Erlbaum.

Arkell, H. (1996). Dyslexia: the early days in Denmark. *Dyslexia: An International Journal of Research and Practice*, 2(3), 150-51.

Armstrong, D. G., Henson, K. T., & Savage, T. V. (1985). *Education: An introduction* (2nd ed). New York: Macmillan Publishing.

Azzam, R. (1993). The nature of Arabic reading and spelling errors of young children. *Reading and Writing*, 5, 355-385.

Baddeley, A. (2008). What's new in working memory? *Psychology Review*, 13, 2-5.

Badian, N. (1997). Dyslexia and the double deficit hypothesis. *Annals of Dyslexia*, 47, 68-86.

Badian, N., Duffy, F., Als, H. & McAnulty, G. (1991). Linguistic profiles of dyslexics and good readers. *Annals of Dyslexia*, 41,221-245.

BDA (2003). Website:www.bda-dyslexia.org.uk

BDA (1996). British Dyslexia Association: *Guide for the Medical and Health Care Profession. Reading*: British Dyslexia Association.

Bentin, S., Deutsch, A. & Liberman, I. A. (1990). Syntactic competence and reading ability in children. *Journal of Experimental Child Psychology*, 48, 147-72.

Bishop, D. V., Bishop, S. J., James, C., Delaney, T. & Tallal, P. (1993). Different origin of auditory and phonological processing problems in children with language impairment: evidence from a twin study. *Journal of Speech, Language and Hearing Research*, 42: 155-68.

Bishop, D., & Snowling, M. (2004). Developmental dyslexia and specific language impairment : Same or different? *Psychological Bulletin*, 130(6), 858-886.

Blalock, G. & Patton, J. R. (1996). Transition and students with learning disabilities: Creating sound futures. *Journal of Learning Disabilities*, 29 (1), 7-16.

Blau, V., van Atteveldt, N., Ekkebus, M., Goebel, R., & Blomert, L. (2009). Reduced neural integration of letters and speech sounds links phonological and reading deficits in adults dyslexia. *Current Biology*, 19, 503-508.

Blau, V., Reithler, J. van Atteveldt, N., Seitz, J., Gerretsen, P., Goebel, R., & Blomert, L. (2010). Deviant processing of letters and speech sounds as proximate cause of the reading failure: A functional resonance imaging study of dyslexic children. *Brain*, 133, 868-879.

Boden, C. & Giaschi, D. (2007). M-stream deficits and reading-related visual processing in developmental dyslexia. Psychological Bulletin, 133(2), 346-366.

Bowers, P. & Wolf, M. (1993). Theoretical links among naming speed, precise timing mechanisms and orthographical skill in dyslexia. *Reading and Writing*, 5(1), 69-85.

Boets, B., Wouters, J., van Wieringen, A., de Smedt, P. & Ghesquiere, P. (2008). Modelling relations between sensory processing, speech perception, orthographic and phonological ability, and literacy achievement. *Brain and Language*, 106, 29-40.

Boets, B., Wouters, J., van Wieringen, A., de Smedt, P. & Ghesquiere, P. (2007). Auditory processing, speech perception and phonological ability in pre-school children at high-risk for dyslexia: A longitudinal study of the auditory temporal processing theory. *Neuropsychologia*, 45, 1608-1620.

Bosse, M., Tainturier, M. & Valdios, S. (2007). Developmental dyslexia: The visual attention span deficit hypothesis. *Cognition*, 104(2), 198-230.

Bosse, M., & Valdios, S. (2003). Patterns of developmental dyslexia according to a multi-trace memory model of reading. Current Psychology Letters, 1, 10. Accessed on: http://cpl.revues.org/document

Bosse, M., & Valdios, S. (2009). Influence of the visual attention span on child reading performance: A cross-sectional study. *Journal of Research in Reading*, 32(2), 230-253.

Bradley, L. & Bryant, P. E. (1978). Difficulties in auditory organization as a possible cause of reading backwardness. *Nature*, 271, 746-747.

Bradley, L. & Bryant, P. E. (1983). Categorising sounds and learning to read: A causal connection. *Nature*, 310, 419-21.

Brandy, S., Shankweiler, D. & Mann, V. (1983). Speech perception and memory coding in relation to reading ability. *Journal of Experimental and Child Psychology*, 35: 345-67.

Bretherton, L. & Holmes, V. (2003). The relationship between temporal auditory processing, phonemic awareness, and reading disability. *Journal of Experimental Child Psychology*, 84, 218-243.

Briscoe, J., Bishop, D. V., & Norbury, C. F. (2001). Phonological processing, language, and literacy: A comparison of children with mild-to-moderate sensotineural hearing loss and those with specific language impairment. *Journal of Child Psychology and Psychiatry*, 42(3), 329-340.

British Dyslexia Association (1996). *Music and Dyslexia*. Reading: British Dyslexia Association.

British Psychological Society (1999). *Dyslexia, Literacy and Psychological Assessment. Report of a Working Party of the Division of Education and Child Psychology of the British Psychological Society*. Leicester: British Psychological Society.

British Dyslexia Association (BDA) (2005). *The Dyslexia Handbook*. Reading: British Dyslexia Association.

Brown, W. E., Eliez, S., Menon, V., Rumsey, J. M., White, C. D. & Reiss, A. L. (2001). Preliminary evidence of widespread morphological variations of the brain in dyslexia. *Neurology,* 56: 781-3.

Bruch, M. (1989). The adult outcomes of children with learning disabilities. *Annals of Dyslexia*, 39, 252-263.

Bruck, M., Genesse, F., & Caravolas, M. (1997). A cross-linguistic study of early literacy acquisition. In B. Blachman (Ed.), *Foundation of Reading Acquisition and Dyslexia*, 145-162. London: LEA.

Bruck, M., & Treiman, R. (1990). Phonological awareness and spelling in normal children and dyslexics- the case of clinical consonant cluster. *Journal of Experimental Child Psychology*, 50(1), 156-178.

Brunswick, N., McCrory, E., Price, C. J., Frith, C. D., & Frith, U. (1999). Explicit and implicit processing of words and psuedowords by adult developmental dyslexics: a search for Wernick's Wortschatz? *Brain*, 122: 1901-7.

Burden, R. L. (2008). Dyslexia and self-concept: A review of past research with implications for future action. In G. Reid et al (eds), *The Sage Handbook of Dyslexia*, 395-410. London: Sage.

Caravolas, M. (2005). The nature and causes of dyslexia in different languages. In M. Snowling & C. Hulme (Eds). *The science of reading: A handbook*, (336-356). London, UK: Blackwell Publishing.

Carroll, J., Maughan, B., Goodman, R. & Meltzer, H. (2005). Literacy difficulties and psychiatric disorders: evidence for comorbidity. *Journal of Child Psychology and Psychiatry*, 46, 524-532.

Carroll, J. M., & Snowling, M. J. (2004). Language and phonological skills in children at high risk of reading difficulties. *Journal of Child Psychology and Psychiatry*, 2004, 45(3), 631-640.

Casey, R., Levy, S., Brown, K., Brooks-Gunn, J. (1992). Impaired emotional health in Children with mild reading disability. *Developmental and Behavioural Paediatrics*, 13, 256-260.

Castles, A., & Coltheart, M. (2004). Is there a causal link from phonological awareness to success in learning to read? *Cognition*, 91, 77-111.

Catts, H., & Kamhi, A. (1999). *Language and reading disabilities*. Massachusetts: Allyn & Bacon.

Cestnick, L. (2001). Cross-modality temporal processing deficit in developmental phonological dyslexia. *Brain and Cognition*, 46: 175-6.

Chasty, H. (1985). What is dyslexia? A developmental language perspective. In: M. J. Snowling (Ed.), *Children's written language difficulties*,11-27. Windsor: NFER-Nelson.

Comelissen, P., Richardson, A., Mason, A., Fowler, S., & Stein, J. (1995). Contrast sensitivity and coherent motion detection measured at photopia luminance levels in dyslexics and controls. *Vision Research*, 35: 1483-94.

Compton, D., DeFries, J., & Olson, R. (2001). Are RAN and phonological awareness-deficits additive in children with reading disabilities? *Dyslexia*, 7 (3), 125-149.

Cossu, G. (1999). The acquisition of Italian orthography. In M. Hariss and G. Hatano (Eds.), *Learning to Read and Write*: *A Cross-Linguistic Perspective,* 10-33. Cambridge University Press.

Covington, M. V. (1992). *Making the grade Cambridge*. Cambridge University Press.
Critchley, M. (1964). *Developmental Dyslexia*. London: Heinemann.

Critchley, M. (1970). *The Dyslexic Child*. London: Heinemann.

Critchley, M (1981). Dyslexia: an overview, in G.Th. Pavlidis and T. R. *Miles* (Eds.), *Dyslexia Research and it Applications to Education*. Chichester: Wiley.

Cronin, M. E. (1996). Life skills curricula for students with learning disabilities: A review of the literature. *Journal of Learning Disabilities*, 29 (1), 53-68.

Denckla, M. B. (1972). Color-naming deficits in dyslexic boys. *Cortex*, 8,164-176.

Dearing, R. (1997). *Higher Education in the Learning Society: Report of the Committee of Inquiry into Higher Education*. London: Department for Education and Employment (DfEE).

Denckla, M. B., & Rudel, R. G. (1976). Rapid automatized naming (R. A. N): Dyslexia differentiated from other learning disabilities. *Neuropsychologia*, 14,471-479.
Denckla, M. B., Rudel, R. G., Chapman, C., & Krieger, J. (1985). Motor proficiency in dyslexic children with and without attentional disorders. *Archives of Neurology*, 42: 228-31.

DeFries, J. C. Fulker, D. W. & LaBuda, M. C. (1987). Reading disability in twins. Evidence for a genetic etiology. *Nature*, 329, 537-539.

DePonio, P. (2001). Dyslexia and self-awareness: Issues for secondary schools. Proceedings of the 5th BDA International Conference, York. Accessed on: www.bdainternationalconference.org

Doyle, J. (1999). *Dyslexia: An Introductory Guide*. Whurr Publishers Ltd. London.

Disability Committee (2007) DED Group: Sub Group Report on Curriculum Accessibility. X University.

Disability Equality Scheme Update (2007). Accessed on 23 December 2011. On: http://www.legislation.gov.uk/uksi/2007/1496/made>.

Dubois, M., De Micheaux, P., Noel, M., & Valdois, S. (2007). Preorthographical constraints on visual word recognition: Evidence from a case study of developmental surface dyslexia. *Cognitive Neuropsychology*, 24(6), 623-660.

Dubois, M., Kyllingsbaek, S., Prado, C., Musca, S., Peiffer, E., Lassus-Sangosse, D., et al. (2010). Fractionating the multi-character processing deficit in developmental dyslexia: Evidence from two case studies. *Cortex*, 46(6), 717-738.

Eden, G. F., Stein, J. F., Wood, H. M., & Wood, F. B. (1994). Differences in eye movements and reading problems in dyslexic and normal children. *Vision Research*, 34: 1345-58.

Elbeheri, G. & Everatt, J. (2007). Literacy ability and phonological processing skills amongst dyslexic and non-dyslexic speakers of Arabic. *Reading and Writing*, 20, 273-294.

Elbeheri, G., Everatt, J., Reid, G. and Al Mannai, H. (2006). Dyslexia Assessment in Arabic. *Journal of Research in Special Education Needs*, 6, 143-152.

Ellis, A. (1993). *Reading, writing and dyslexia, a cognitive analysis*. East Sussex: Psychology Press.

Elbeheri, G., Mahfoudhi, A. & Everatt, J. (2009). Reading and dyslexia in Arabic. In G Reid (ed.). The Routledge Companion Book to Dyslexia, 656-678. Routledge Pub

Ellis, A. W., McDougall, S. J. P., & Monk, A. F. (1996). Are dyslexics different? I A comparison between dyslexics, reading age controls, poor readers and precocious readers. II Individual differences among dyslexics, reading controls, poor readers and precocious readers. *Dyslexia: An International Journal of Research and Practice*, 2(1), 31-68.

Ellis, N. (1994). The cognitive psychology of developmental dyslexia. In G. Hales (Ed.), *Dyslexia Matters* (pp. 56-69). London: Whurr.

Everatt, J. Elbeheri G., (2009). Dyslexia in different orthographies: variability in transparency. In G. Reid et al (eds), The Sage Handbook of Dyslexia, (428-437). London: Sage.

Everatt, J., Smythe, I., Ocampo, D., & Gyarmathy, E. (2004). Issues in the assessment of literacy-related difficulties across languages and backgrounds: A cross-linguistic comparison. *Journal of Research in Reading*, 27, 141-151.

Facoetti, A., Trussardi, A., Ruffino, M., Lorusso, M., Cattaneo, C., Galli, R., Molteni, M., & Zorzi, M. (2010). Multisensory spatial attention deficit are predictive of phonological decoding skills in developmental dyslexia. *Journal of Cognitive and Neuroscience*, 22(5), 1011-1025.

Farmer, M. E., & Klein, R. M. (1995). The Evidence for temporal processing deficit linked to dyslexia. *A review: Psychonomic Bulletin and Review*, 2: 460-93.

Farmer, M. E., & Klein, R. M. (1993). Auditory and visual temporal processing in dyslexic and normal readers. *Annals of the New York Academy of Science*, 682, 339-341.

Farmer, M., Riddick, B., & Sterling, C. (2002). *Dyslexia and inclusion: Assessment and support in Higher Education*. London: Whurr.

Fawcett, A. J. & Nicolson, R. I. (2008). Dyslexia and the cerebellum. In G. Reid et al (eds), *The Sage Handbook of dyslexia*, (77-98). London: Sage.

Fawcett, A. J. (2001). *Dyslexia: Theory and good practice*. London: Whurr.

Fawcett, A. J. (2002). *Reading remediation: An evaluation of complimentary approaches*. London: Department of Education and Science.

Fawcett, A. J., & Nicolson, R. I. (1992). Automatisation deficits in balance for dyslexic children. *Perceptual and Motor Skills*, 75(2), 507-529.

Fawcett, A. J., & Nicolson, R. I. (1995). Persistence of phonological awareness deficit in older children with dyslexia. *Reading and Writing*, 7, 361-376.

Fawcett, A. J., & Nicolson, R. I. (1996). *The dyslexia screening test*. London: Psychological Corporation.

Fawcett, A. J., & Nicolson, R. I. (1998). *The dyslexia adult screening test*. London: Psychological Corporation.

Fawcett, A. J., & Nicolson, R. I. (1999). Performance of dyslexic children on cerebellar and cognitive tests. *Journal of Motor Behavior*, 31, 68-78.

Fawcett, A. J., & Nicolson, R. I. (2001). Developmental dyslexia: The cerebellar deficit hypothesis. *Dyslexia Contact*, 20 (2), 13.

Fawcett, A. J., & Nicolson, R. I. (2002). Children with dyslexia are slow to articulate a single speech gesture. *Dyslexia: An International Journal of Research and Practice*, 8, 189-203.

Fawcett, A. J., & Nicolson, R. I. (2004a). *The dyslexia screening test (junior)*. London: The Psychological Corporation.

Fawcett, A. J., & Nicolson, R. I. (2004b). *The dyslexia screening test (secondary)*. London: The Psychological Corporation.

Fawcett, A. J., Nicolson, R. I., & Dean, P. (1996). Impaired performance of children with dyslexia on a range of cerebellar tasks. *Annals of Dyslexia*, 46:159-83.

Fawcett, A. J., Nicolson, R. I., & Lee, R. (2004). *Ready to learn*. San Antonio, TX: The Psychological Corporation.

Feltham, C. (1995). *What is counselling*? London: Sage publication Inc.

Fields, L. (1991). A psychological inquiry into the nature of the condition known as congenital word-blindness. *Brain*, 44:286-307.

Field, S. (1996). Self-determination instructional strategies for youth with learning disabilities. *Journal of Learning Disabilities*, 29 (1) 40-52.

Field, S., & Hoffmann, A. (1996a). Promoting self-determination in school reform, individualized planning, and curriculum efforts. In D. J. Sands & M. L. Wehmeyer (Eds)., Self-determination across the life-span (pp. 197-213). Baltimore, MD: Paul H. Brookes.

Firman, C. (2000). "The bilingual dyslexic child: An overview of some of the difficulties encountered." In J. Townend & M. Turner (Eds.), *Dyslexia in Practice: A Guide for Teachers*, (pp.57-66). New York: Kluwer Academic & Plenum Publishers.

Fiske, E. B. (1991). *Smart schools, smart kids*. New York: Simon & Schuster.

Fowler, A. (1991). How early phonological development might set the stage for phoneme awareness. In S. A. Brady & D. P. Shankweiler (Eds.), *Phonological Processing in Literacy: A Tribute to Isabelle Liberman* (pp. 97-117). New Jersey: Erlbaum.

Frith, U. (1997). Brain, mind and behaviour in dyslexia. In C. Hulme & M. Snowling (Eds.), *Dyslexia: Biology, cognition and intervention* (pp. 1-19). London: Whurr.

Fuller, M., Healey, M., Bradley, A. & Hall, T. (2004) Barriers to learning: a systematic study of the experience of disabled students in one university, *Studies in Higher Education*, 29, 303-318.

Galaburda, A. M., Sherman, G. F., Rosen, G. D., Aboitiz, F., & Geschwind, N. (1985). Developmental dyslexia: Four consecutive cases with cortical anomalies. *Annual Neurology*, 18, 222-233..

Georgiou, G., Protopapas, A., Papadopoulos, T., Skaloumbakas, C., & Parrila, R (2010). Auditory temporal processing and dyslexia in an orthographically consistent language. *Cortex*, 46, 1330-1344.

Gayan, J. & Oslon, R. K. (2001). Genetic and environmental influences on orthographic and phonological skills in children with reading difficulties. *Developmental Neuropsychology*, 20 (2), 483-707.

Geva, E., & Siegel, L. (2000). Orthographic and cognitive factors in the concurrent development of basic reading skills in two languages. *Reading and Writing: An Interdisciplinary Journal*, 12, 1-30.

Gibson, S. & Kendall, L. (2011). Stories from school: dyslexia and learners' voices on factors impacting on achievement. *Support for Learning*, 25(4), 187-193.

Gibson, L., Hogben, J., & Fletcher, J. (2006). Visual and auditory processing and component reading skills in developmental dyslexia. *Cognitive Neuropsychology*, 23, 621-642.

Gilger, J. W. (1996). How can behavioural genetic research help us understand language development and disorders? In Rice, M. L. (Ed.), *Towards a Genetics of Language*. Hillsdale, NJ, England: Lawrence Erlbaum Associates.

Gilgil, N. (1995). *Dyslexia: A diagnostic and remedial study*. Cairo: Maktabat Alnahda Almasriyyah.

Gillon, G. (2004). *Phonological awareness: from research to practice*. New York: Guilford Press.

Gilroy, D. E. & Miles, T. R. (1996) *Dyslexia at college* (2nd edn). London: Whurr.

Goswami, U. (2011). A temporal sampling framework for developmental dyslexia. *Trends in Cognitive Science*, 15, 3-10.

Goswami, U., Gerson, D., Astruc, L. (2010). Amplitude envelop perception, phonology and prosodic sensitivity in children with developmental dyslexia. Reading am Writing, 23(8), 995-1019.

Goswami, U., Wang, S., Cruz, A., Fosker, T., Mead, N., & Huss, M. (2011). Language universal sensory deficits in developmental dyslexia: English, Spanish, and Chinese. *Journal of Cognitive Neuroscience*, 23, 325-337.

Goswami, U. (2003). How to beat Dyslexia. *The Psychologist*, 16(9), 462-464.

Goswami, U., Thomson, J., Richardson, U., Stainthorp, R., Hughes, D., Rosen, S., & Scott, S. K. (2002). Amplitude envelope onsets and developmental dyslexia: A new hypothesis. *Proceedings of the National Academy of Science of the United States of America (PNAS)*, 99(16), 10911-10916.

Goswami, U. (2000a). Phonological representations, reading development and dyslexia: Towards a cross-linguistic theoretical framework. *Dyslexia*, 6, 133-151.

Goswami, U. (2000b). Phonology, reading development and dyslexia: Across linguistic perspective. *Annals of Dyslexia*, 52, 141-163.

Goswami, U. (1997). Learning to read in different orthographies: phonological awareness, orthographic representation and dyslexia. In C. Hulme & M. Snowling (Eds), *Dyslexia: Biology, cognition and intervention* (pp. 131-152). London: whurr.

Goswami, U. & Bryant, P. (1990). *Phonological skills and learning to read*. Hove: Psychology Press.

Hales, G. (1994). The Human aspects of dyslexia. In G Hales (Ed). *Dyslexia matters*, 184-198. London: Whurr.

Hamdan, J. & Amayreh, M. (2007). Consonant profile of Arabic speaking school age children in Jordan. *Folia Phoniatrica et Logopaedica*, 59, 55-64.

Hamalainen, J., Leppanen, P., Eklund, K., Thomson, J., Rihardson, U., Guttorm, T., et al., (2009). Common variance in amplitude envelope perception task and their impact on phoneme duration perception and reading and spelling in Finnish children with reading disabilities. *Applied Psycholinguistics*, 30, 511-530.

Hari, R., & Renvall, H., (2001). Impaired processing of rapid stimulus sequences in dyslexia. *Trends in Cognitive Science*, 5, 525-532.

Hatcher, P. J., Hulme, C., Snowling, M. J. (2004). Explicit phoneme training combined with phonic reading instruction helps young children at risk of reading failure. *Journal of Child Psychology and Psychiatry*, 45(2), 338-358.

Hawelka, S., & Wimmer, H., (2008). Visual target detection is not impaired in dyslexic readers. *Vision Research*, 48(6), 850-852.

Higher Education and Adult Training for People with Handicaps (HEATH) (2001). *College Freshmen with Disabilities*: A Biennial Statistical Profile. Washington, DC: HEATH Resource Center, American Council on Education.

Higher Education Statistics Agency (HESA) (2011). Accessed on 10 January 2012. On: http://www.hesa.ac.uk/index.php>

HMG (1995) Disability Discrimination Act, London: HMSO.

Head, H. (1926). *Aphasia and kindred disorders of speech*. London: Macmillan.

Hersh, C. A., Stone, B. J., & Ford, L. (1996). Learning disabilities and learning helplessness: A heuristic approach. *International Journal of Neuroscience*, 84, 103-113.

Hermann, K. (1959). *Reading disability: A medical study of word-blindness and related handicaps*. Copenhagen: Munksgaard.

Hinshelwood, J. (1917). *Congenital Word-Blindness*. London: H. K. Lewis.

Higher Education Statistics Agency (2005) *Student tables: Table 11b-first year UK domiciled HE students by qualification aim (12), mode of study, gender and disability 2004/04*. Available online (Accessed on 15 May 2012) at: http://www.hesa.ac.uk/holisdocs/pupinfo/student/disab0304.htm

Hood, M., & Conlon, E., (2004). Visual and auditory temporal processing and early reading development. *Dyslexia*, 10, 234-252.

Hoffmann, F. J., Sheldon, K. L., Minskoff, E. H., Sautter, S. W., Steidle, E. F., Baker, D. P., Bailey, B. B., & Echols, L. D. (1987). Needs of learning disabled adults. *Journal of Learning Disabilities*, 20 (1), 43-52.

Holes, C. (1995). *Modern Arabic: Structures, functions and varieties*. Essex: Longman Group.

Howe, M. J. A. (1988). Intelligence as an explanation. *British Journal of Psychology*, 79, 349-60.

Hulme, C. & Snowling, M. J. (1992). Deficits in output phonology: An explanation of reading failures? *Cognitive Neuropsychology*, 9, 47-72.

Hultquist, A. (1997). Orthographic processing abilities of adolescents with dyslexia. *Annals of Dyslexia*, 47, 89-107.

Irving, J. Williams, D. (2000). *Counselling As "Western Religeon": Implication for Work Across Cultures*. Department of Psychology, University of Hull.

Hunter-Carsch, M. & Herrington, M. (2001). *Dyslexia and effective learning in secondary and tertiary education*. London: Whurr

Katz, L. & Frost, R. (1992). The reading process is different in different orthographies: the orthographic depth hypothesis. In R Frost & L Katz (eds). *Orthography, phonology, morphology and meaning*. Amsterdam: North-Holand.

Kirk, J. & Reid, G. (2008). An Examination of the relationship between dyslexia and offending in young people and the implications for the training system. *Dyslexia* 7(2), 77-84.

Kamin, L. J. (1977) *The Science and Politics of IQ*. Harmondsworth: Penguin.

Katzner, K. (2002). *The Languages of the World*. (3rd Ed.), Routledge, Tylor & Francis Group. London, New York.

Kavale, K. A. & Forness, S. R. (1996). Social skills deficit and learning disabilities: a meta-analysis, *Journal of Learning Disabilities*, 29, 226-237.

Klein, C., & Sunderland, H. (1998) *Dyslexia good practice guide*. London: Language and Literacy Unit.

Knight, D., & Hynd, G. (2002). The neurobiology of dyslexia. In G. Reid & J. Wearmouth (Eds.), *Dyslexia and literacy*: Theory and practice (pp. 29-43). London: Wiley & Sons.

Koffka, K (1935). *Principles of gestalt psychology*. New York: Harcourt Brace.

Kussmaul, A. (1878). Word-deafness and word-blindness, In H. Vo. Ziemssen (Ed.), *Cyclopaedia of the Practice of Medicine*, vol. 14, Diseases of the nervous system and disturbances of speech. London: Sampson Row, Maston, Searle and Rivington.

Landerl, K., & Willburger, E., (2010). Temporal processing, attention and learning disorders. *Learning and Individual Differences*, 20, 393-401.

Landerl, K. (2000). Influences of orthographic consistency and reading instruction on the development of nonword reading skills. *European Journal of Psychology of Education*, 15, 239-257.

Landerl, K. (2001). Word recognition deficits in German: more evidence from a representative sample. *Dyslexia*, 7, 183-196.

Landerl, K., Wimmer, H., & Frith, U. (1997). The impact of orthographic consistency on dyslexia: A German-English comparison. *Cognition*, 63, 315-334.

Leonard, C. M., Eckert, M. A., Lombardino, L. J., Okland, T., Kranzler, C. M., King, W. M., & Freeman, A. (2001). Anatomical risk factors for phonological dyslexia. *Cerebral Cortex*, 11(2), 148-157.

Lundberg, I., Frost, J., & Peterson, O. P. (1988). Effects of an extensive program for stimulating phonological awareness in preschool children. *Reading Research Quarterly*, 23, 263-284.

Lundberg, I., & Hoien, T. (2001). Dyslexia and phonology. In A. Fawcett (Ed.), *Dyslexia, theory and good practice* (pp. 109-123). London: Whurr.

MacMeeken, M. (1942). *Developmental aphasia in educationally retarded children*. London: University of London Press.

Madriaga, M. (2007). Enduring disablism: students with dyslexia and their pathways into UK higher education and beyond. *Disability and Society*, 22, 399-412.

Madriaga, M., Walker, A., Hanson, C., Kay, H. & Newitt, S. (2010). Confronting the same barriers: disabled and non-disabled students' learning and assessment experiences at one UK University. *Studies in Higher Education*, 35(6), 647-658.

Manis, F. R., Szeszulski, P. A., Holt, L. K., & Graves, K. (1988). A developmental perspective on dyslexic subtypes. *Annals of Dyslexia*, 38, 139-153.

Mampe, B., Friederici, A., Christophe, A., & Wermke, K. (2009). Newborns' cry melody is shaped by their native language. *Current Biology*, 19(23), 1994-1997.

Marshall, C., Snowling, M., & Bailey, P. (2001). Rapid auditory processing and phonological ability in normal readers and readers with dyslexia. *Journal of Speech, Language, and Hearing*, 44,925-940.

McAnally, K. L., & Stein, J. F. (1996). Abnormal auditory transient brainstem function in dyslexia. *Proceedings of the Royal Society B.*, 263, 961-965.

McLean, G., Stuart, G., Coltheart, V., & Castles, A. (2011). Visual temporal processing in dyslexia and the magnocellular deficit theory: The need for speed? *Journal of Experimental Psychology: Human Perception and Performance*, 37, 1957-1975.

McLeod, J. (1997). An introduction to counselling. Buckingham, Philadelphia: Open University Press.

McQaurrie, L., & Parrila, R. (2009). Phonological representation in deaf children: Rethinking the "functional evidence" hypothesis. *Journal of Deaf Studies and Deaf Education*, 14, 137z-154.

McLeod, J. (1997). *An Introduction to Counselling*. Buckingham, Philadelphia: Open University Press.

McLoughlin, D., Fitzgibbon, G., & Young, V. (1994). *Adult Dyslexia: Assessment Counselling and Training*. London: Whurr.

McLoughlin, D., Leather, C., & Stringer, P. (2002). *The adult dyslexic: Interventions and outcomes*. London: Whurr.

Mehler, J., Jusczyk, P., Lambertz, G., Halsted, N., Bertinocini, J., Amiel-Tison, C. (1988). A precursor of language acquisition in young infants. *Cognition*, 29, 143-178.

Miles, E. & Miles, T. (1999). *Dyslexia: A hundred years on*. Buckingham: Open University Press.

Miles. T. R. (1982). *The Bangor Dyslexia Test*. Wisbech: LDA.

Miles. T. R. (1983a). *Dyslexia: The pattern of difficulties*. St. Albans: Granada Publishing Co.

Miles. T. R. (1983b). On the persistence of dyslexic difficulties into adulthood. In: J. B. Bath, S. J. Chinn and D. E. Knox (Eds), *Dyslexia: Research and its Applications to the Adolescent*, pp. 88-100. Bath: Better Book.

Miles, T. R. (1988). Counselling in dyslexia. *Counselling Psychology Quarterly*, 1, 97-107.

Miles. T. R. (1990). Towards an overall theory of dyslexia. In: G. Hales (Ed.), *Meeting Points in Dyslexia. Proceedings of the first International Conference of the British Dyslexia Association* (pp. 50-53). Hull: British Dyslexia Association.

Miles. T. R., Haslum, M. N. & Wheeler, T. J. (1998). Gender ratio in dyslexia. *Annals of Dyslexia*, 48, 27-55.

Miller Guron, L., & Lundberg, I. (2004). Error patterns in word reading among primary school children: a cross-orthographic study. *Dyslexia*, 10 (1), 44-60.

Mody, M., Studdert-Kennedy, M., & Brady, S. (1997). Speech deficit in poor readers: auditory processing or phonological processing? *Journal of Experimental Psychology*, (64), 370-96.

Montgomery, F. (2007). Disability Equality Scheme, 2006-2009: Disability Equality Duty Implementation Group.

Monroe, M. (1932). *Children who Cannot Read. Chicago*, IL: University of Chicago Press.

Morgan, W. P. (1896). A case study of congenital word blindness. *British Medical Journal*, (2), 1378.

Morgan, E. & Klein, C. (2000). The dyslexia adult in a non-dyslexic world. London: Whurr.

Morton, J., & Frith, U. (1995). Causal modelling: A structural approach to developmental psychopathology. In: D. Cicchetti & D. J. Cohen (Eds.), *Manuals of Developmental Psychopathology* (pp. 357-390). NY Psychological Assessment of Dyslexia: Wiley.

Mortimore, T. (2006). *The impact of dyslexia and cognitive style upon the study skills and experience of students in the higher education*. Unpublished PhD thesis, Department of Social Sciences, Cardiff University.

Mortimore, T. & Crozier, W. (2006). Dyslexia and difficulties with study skills in higher education. *Studies in Higher Education*, 31(2), 235-251.

Muneaux, M., Ziegler, J., True, C., Thomson, J., & Goswami, U., (2004). Deficits in beat perception and dyslexia: Evidence from French. *NeuroReport,* 15, 1255-1259.

Naidoo, S. (1972). *Specific Dyslexia*. London: Pitman.

Nation, K., & Snowling, M. J. (1998). Individual differences in contextual facilitation: evidence from dyslexia and poor reading comprehension. *Child Development*, 69, 996-1011.

National Working Party on Dyslexia in Higher Education (1991). *Dyslexia in higher education: policy, provision and practice*. (Hull, University of Hull)

Needle, J. L., Fawcett, A. J., & Nicolson, R. I. (2006a). Balance and dyslexia: An investigation of adults' abilities. *European Journal of Cognitive psychology*, 18 (6), 909-936.

Nicolson, R. I. (1996). Developmental dyslexia: Past, present & future. *Dyslexia*, 2(3), 190-207.

Nicolson, R. I., & Fawcett, A. J. (1990). Automaticity: A new framework for research? *Cognition*, 35(2), 159-182.

Nicolson, R. I., & Fawcett, A. J. (1994). *The Dyslexia Early Screening Test* (DAST). London: The Psychological Corporation.

Nicolson, R. I., & Fawcett, A. J. (1994a). Comparison of deficits in cognitive and motor-skills among children with dyslexia. *Annals of Dyslexia*, 44, 147-164.

Nicolson, R. I., & Fawcett, A. J. (1994b). Reaction times and dyslexia. *Quarterly Journal of Experimental Psychology*, 47A, 29-48.

Nicolson, R., & Fawcett, A. (1995). Dyslexia is more than a phonological disability. *Dyslexia: An International Journal of Research and Practice*, 1 (1), 19-37.

Nicolson, R. I., & Fawcett, A. J. (1996). *The Dyslexia Early Screening Test*. London: The Psychological Corporation.

Nicolson, R., & Fawcett, A. (1999). Developmental dyslexia: the role of the cerebellum. *Dyslexia*, 5 (3), 155-177.

Nicolson, R. I. (2001). Developmental dyslexia: Into the future. In A. J. Fawcett (Ed.), *Dyslexia: Theory and Good Practice*. London: Whurr.

Nicolson, R. (2002). The dyslexia ecosystem. *Dyslexia: An International Journal Research and Practice*, 8(2), 55-66.

Nicolson, R. I., & Fawcett, A. J. (2004a). Climbing the reading mountain: Learning from the science of learning. In G. Reid & A. J. Fawcett (Eds.), *Dyslexia in context: Research, Policy and Practice*. London: Whurr.

Nicolson, R. I., & Fawcett, A. J. (2004b). *The dyslexia early screening test*, (2nd ed). London: The Psychological Corporation.

Nicolson, R., & Fawcett, A. (2006). *Dyslexia, learning and the brain*. The MIT Press.

Nicolson, R., & Fawcett, A. (2008). *Dyslexia, learning and the brain*. London: The MIT Press.

Nicolson, R. I., & Fawcett, A. J. (2006). Do cerebellar deficits underlie phonological problems in dyslexia? *Developmental Science*, 9(3), 259-262.

Nicolson, R., & Fawcett, A. (2007). Procedural learning difficulties: reuniting the developmental disorders? *Trends in Neuroscience*, 30 (4), 135-141.

Nicolson, R. I., Fawcett, A. J., & Dean, P. (1995). Time-estimation deficits in developmental dyslexia: evidence of cerebellar involvement. *Proceedings of the Royal Society of London Series B-Biological Sciences*, 259,(1354), 43-47.

Nicolson, R. I., Fawcett, A. J., & Dean, P. (2001). Developmental dyslexia: The cerebellar deficit hypothesis. *Trends in Neuroscience*, 24(9), 508-511.

Nicolson, R. I., Fawcett, A. J., Moss, H., & Nicolson, M. K. (1999). Early reading intervention can be effective and cost effective. *British Journal of Educational Psychology*, 69, 47-62.

Obler, L., & Gjerlow, K. (1991). *Language and the brain*. Cambridge: Cambridge University Press.

Olson, R. K., Gillis, J. J., Rack, J. P., & Fulker, D. W. (1989). Specific deficits in component reading and language skills: Genetic and environmental influences. *Journal of Learning Disabilities*, 22, 339-348.

Olson, R. K., Wise, B., Conners, F. A., & Rack, J. P. (1990). Organization, heredity, and remediation of component word recognition and language skills in disabled readers. In T. H. Carr and B. A. Levy (Eds.), *Reading and its Development: Component Skills approaches* (pp. 261-322). New York: Academic Press.

Orton Dyslexia Society (1995). *Perspectives in dyslexia*, 30:5.

Orton, S. T. (1937/1989). *Reading, writing, and speech problems in children and selected Papers*. Austin, TX: Pro-Ed.

Paget, K. & Reynolds, C. (1984). Dimensions, levels and reliabilities in the revised children's manifest anxiety scale with learning disabled children. *Journal of Learning Disabilities,* 17, 137-141.

Pavey, B., Meehan, M. & Waugh, A. (2010). *Dyslexia-Friendly further Higher Education*. London: Sage.

Platt, J. R. (1973). The Skinnerian revolution. In H. Wheeler (Ed.), *Beyond the Punitive Society*. London: Wildwood House.

Pollack, D. (2009). *Neurodiscovery in Higher Education*. Chichester: Wiley.

Pumfrey, P. (2001). Specific developmental dyslexia: "Basics to back" in 2000 and beyond. In M. Hunter-Carsch (Ed.), *Dyslexia: A psychological perspective* (pp. 137-159). London: Whurr.

Pumfrey, P. D. & Reason, R. (1991). *Specific learning difficulties. (Dyslexia): Challenges and responses*. London: Whurr.

Pumfrey, P. D. (2008). Moving towards inclusion? The first degree results of students with and without disabilities in Higher Education in the UK: 1998-2005. *European Journal of Special Needs Education*, 23, 31-46.

Protopapas, A., & Skaloumbakas, C. (2007). Traditional and computer-based screening and diagnosis of reading disabilities in Greek. *Journal of Learning Disabilities*, 40, 15-36.

Rack, J. P. (1994). Dyslexia: The phonological deficit hypothesis. In A. Fawcett & R. Nicolson (Eds.), *Dyslexia in Children: Multidisciplinary Perspectives* (pp. 5037). Harvester Wheatsheaf: Hemel Hempstead.

Ramus, F. & Szenkovits, G. (2008). What phonological deficit? *Quarterly Journal of Experimental Psychology*, 61(1), 129-141.

Ramus, F. (2003). Developmental dyslexia: Specific phonological deficit or general sensorimotor dysfunction? *Current Opinion in Neurobiology*, 13, 212-218.

Ramus, F., Rosen, S., Dakin, S., Day, B., Castellote, J., White, S., et al., (2003). Theories of developmental dyslexia: Insight from a multiple case study of dyslexic adults. *Brain*, 126, 841-865.

Ramus, F. (2004). The neural basis of reading acquisition. In M. S. Gazzaniga, (Ed.), *The Cognitive Neuroscience* (3rd ed., pp. 815-824). Cambridge, MA, US: MIT Press.

Reid, G., & Hinton, J. W. (1999). Teacher work stress and school organisation: A suitable case for INSET. *Education Today*, 49(4), 30-37.

Reid, G. (1998). *Dyslexia: A practitioner's handbook* (2nd ed.). Chichester: Wiley & Sons.

Reid, G. (2002). Definitions of dyslexia. In M. Johnson & L. Peer (Eds.), *The dyslexia handbook 2002* (pp. 68-74). Reading: The British Dyslexia Association.

Reid, G. (2003). *Dyslexia: A practitioner's handbook* (3rd ed.). Chichester. Wiley & Sons.

Reid, G., & Fawcett, A. (Eds). (2004). *Dyslexia in Context: Research, Policy and Practice*. London: Whurr.

Reid, G., & Kirk, J. (2001). *Dyslexia in adults: Education and Employment* . Chichester: Wiley & Sons.

Reid, G., & Kirk, J. (2002). *Dyslexia in adults: Theory and Practice*. Chichester: Wiley & Sons.

Riddick, B., Farmer, M. & Sterling, C. (1997). *Students and dyslexia: growing up with a specific learning difficulty*. London: Whurr.

Riddick, B. (2010). *Living with dyslexia: the social and emotional consequences of specific learning difficulties/disabilities*. (2nd edn). London: Routledge.

Richardson, J. T. E. & Wydell, T. N. (2003). *The representation and attainment of students with dyslexia in UK higher education, Reading and Writing*, 16, 475-503.

Reid, G., Came, F. & Price, L. A. (2008). Dyslexia: Workplace issues. In G. Reid et al (eds). *The Sage Handbook of dyslexia*, (474-486). London: Sage.

Robertson, J. (2000). *Dyslexia and reading: A neuropsychological approach*. London: Whurr.

Rose, J. (2009). *Identifying and teaching children and young people with dyslexia literacy difficulties*. London: DDFCSF.

Rosen, S., & Manganari, E. (2001). Auditory processing in dyslexia and specific language impairment: Is there a deficit? What is its nature? Does it explain anything? *Journal of Phonetics*, 31, 509-527.

Romani, C., Tsouknida, E., di Betta, A., & Olson, A., (2011). Reduced attentional capacity, but normal processing speed and shifting of attention in developmental dyslexia: Evidence from a serial task. *Cortex*, 47(6), 715-733.

Rugel, R. P. (1974). WISC subtest scores of disabled readers: A review respect to Bannatyne's recategorization. *Journal of Learning Disabilities*, 7, 48-55.

Saiegh-Hadded, E. (2005). Correlates of reading fluency in Arabic: Diglossic and orthographic factors. *Reading and Writing*, 18, 559-582.

Salloum, H. (2003). The odyssey of the Arabic language and its script. Retrieved 20 March, 2010, from http://www.alhewar.com/habeeb_salloum_arabic_language.htm

Share, D. (2008). On the anglocentricities of current reading research and practice: The perils of overreliance on an "outlier" orthography. *Psychological Bulletin*, 134, 584-615.

Share, D. L. (1996). Word recording and spelling processes in specific reading disabled and garden-variety poor readers. *Dyslexia: An International Journal of Research and Practice*, 2(3), 167-74.

Siegel, L. S. (1989). IQ is irrelevant to the definition of learning disabilities. *Journal of Learning Disabilities,* 22(8): 469-78, 486.

Siegel, L. S. (1992). An evaluation of the discrepancy definition of dyslexia. Journal of Learning Disabilities 25, 618-629.

Siegel, L. S., & Ryan, E. B. (1988). Development of grammatical-sensitivity, phonological, and short-term memory skills in normally achieving and learning disabled children. *Developmental Psychology*, 24, 28-37.

Singleton, C. & Aisbitt, J. (2001). *A Follow-Up of the National Working Party Survey of Dyslexia Provision in UK Universities*. Paper presented at the 5th British Dyslexia Association International Conference, University of York.

Singleton, C. H. (Ed.), (1991). Computer applications in the diagnosis and assessment of cognitive deficit in dyslexia. In: *Computers and Literacy Skills*. Pp. 149-159. Hull: British Dyslexia Association.

Shaywitz, S. E., Shaywitz, B. A., Fletcher, J. M., & Escobar, M. D. (1990). Prevalence of reading disorders in boys and girls: results of the Connecticut Longitudinal study, *Journal of American Medical Association*, 264, 998-1002.

Skinner, B. F. (1953). *Science and Human Behavior*. New York: The Free Press.

Seymoue, P., Aro, M. & Erskine, J. (2003). Foundation literacy acquisition in European orthographies. *British Journal of Psychology*, 94, 143-174.

Smythe, I., Everatt, J (2004). Dyslexia- a cross linguistic framework. In I Smythe, J Everatt and R Salter (eds). *The International Book of Dyslexia*, Part 1. London: Wiley.

Smythe, I., Everatt, J., & Salter, R. (Eds). (2004). *The international book of dyslexia: A cross-language comparison and practice guide* (2nd ed.). Chichester: Wiley & Sons.

Snowling, M. (2000). *Dyslexia* (2nd ed.). Oxford: Blackwell.

Snowling, M., & Stackhouse, J. (1997). *Dyslexia, speech and language: A practitioner's handbook.* London: Whurr.

Spencer, K. (2001). Differential effects of orthographic transparency on dyslexia: Word reading difficulty for common English words. Dyslexia: *An International Journal of Research and Practice*, 7(4), 217-228.

Spielberger, C., Gorsuch, D. & Lushene, R. (1983). *State-Trait Anxiety Inventory*. San Francisco, CA: Counsulting Psychologists Press.

Stampoltzis, A. & Polychronopoulou, S. (2008). Dyslexia in Greek higher education: a study of incidence, policy and provision. *Journal of Research in Special Educational Needs*, 8(1), 37-46.

Stanovich, K. E. (1991). The theoretical and practical consequences of discrepancy definitions of dyslexia. In M. Snowling and M. E. Thomson (Eds.), *Dyslexia: Integrating Theory and Practice.* London: Whurr.

Stein, J., Talcott, B., & Walsh, V. (2000). Controversy about the evidence for a visual magnocellular deficit in developmental dyslexics. *Trends in Cognitive Sciences*, 4, 209-211.

Stein, J. (2004). Dyslexia genetics. In G. Reid & A. Fawcett (Eds.), *Dyslexia in context: research, policy and practice* (pp. 76-89). London: Whurr.

Stein, J. (2008). The neurobiological basis of dyslexia. In G. Reid et al (eds), The Sage Handbook of Dyslexia, (53-76). London: Sage.

Super, D. E. (1969). Vocational development theory: Persons, positions and processes. *Counselling Psychologist* 1, 2-9.

Swan, D., & Goswamin, U. (1977). Phonological awareness deficit in developmental dyslexia and the phonological representation hypothesis. *Journal of Experimental Child Psychology*, 66(1), 18-41.

Swanson, H., Zheng, X., & Jerman, O. (2009). Working memory, short-term memory, and reading disabilities: A selective meta-analysis of the literature. *Journal of Learning Disabilities*, 42, 260-287.

Tallal, P. (1980). Auditory temporal perception, phonics, and reading disabilities in children. *Brain and Language*, 9(2), 182-198.

Tallal, P., Miller, S., & Fitch, R. H. (1993). Neurobiological basis of speech: a case for the pre-eminence of temporal processing. *Annals of the New York Academy of Science*, 682, 27-47.

Thomson, M. E., & Watkins, E. J. (1990). *Dyslexia: A Teaching Handbook. London*: Whurr.

Turner, M. (1997). *Psychological assessment of dyslexia*. London: Whurr.

Valdios. S. (2010). Dyslexia (developmental). In G. F. Koob, M. Le Moal, & R. F. Thompson (Eds). *Encyclopaedia of behavioural neuroscience*, (454-460). Elsevier.

Valdois, S., Bidet-lldei, C., Lassus-Sangosses, D., Reilhac, C., N'Guyen, M., Guinet, E., & Orliaguet, J. (2011). A visual processing but no phonological disorder in a child with mixed dyslexia. *Cortex*, 47, 1197-1218.

Valdois, S., Bosse, M., Ans, B., Carbonnel, S., Zorman, M., David, D., et al. (2003). Phonological and visual processing deficits can dissociate in developmental dyslexia: Evidence from two case studies. *Reading and Writing*, 16(6), 541-572.

Valdois, S., Bosse, M., & Tainturier, M. (2004). The cognitive deficits responsible for developmental dyslexia: review of evidence for a selective visual attentional disorder. *Dyslexia*, 10(4), 339-363.

Vansteenkiste, M., Sierens, E., Soenens, B., Luyckx, K., & Lens, W. (2009). Motivational profiles from a self-determination perspective: The quality of motivation matters. *Journal of Educational Psychology*,101, 671–688.

Veii, K. & Everatt, J. (2005). Predictors of reading among herero-English bilingual Namibian school children. *Bilingualism: Language and Cognition*, 8, 239-254.

Vellution, F., Fletcher, J., Snowling, M., & Scanlon, D. (2004). Specific reading disability (dyslexia): What have we learned in the past four decades. *Journal of Child Psychology and Psychiatry*, 45, 2-40.

Vellutino, F. R. (1987). Dyslexia. *Scientific American* 256, 20-27.

Vickerman, P. & Blundell, M. (2010). Hearing the voices of disabled students in higher education. *Disability and Society*, 25, 21032.

Vidyasagar, T., & Pammer, K. (2010). Dyslexia: A deficit in visuo-spacial attention, not in phonological processing. *Trends in Cognitive Science*, 14(2), 57-63.

Von Euler, C. (2002). Dyslexia: how it started and some of the steps towards the present. In

Von Euler & Hjelmquist (Eds.), *Dyslexia & Literacy* (pp.16-22). London: Whurr.

Wearmouth, J., Soler, J., and Reid, G. (2003). *Meeting difficulties in literacy development: Research, policy and practice*. New York: Taylor & Francis.

Weimer, B. B., Cappotelli, M., & DiCamillo, J. (1994). Self-advocacy: A working proposal for adolescent with special needs. *Intervention in school and clinic*, 30 (1), 47-52.

Wechsler, D. (1949). *The Wechsler Intelligence Scale for Children.* New York: Harcourt Brace Jovanocitch/ Psychological Corporation.

Wechsler, D. (1976). *The Wechsler Intelligence Scale for Children (WAIS-R).* New York: Harcourt Brace Jovanocitch/ Psychological Corporation.

Willcutt, E. & Pennington, B. (2000). Psychiatric comorbidity in children and adolescents with reading disability. *Journal of Child Psychology and Psychiatry*, 4(8), 1039-1048.

Wimmer, H. (1993). Characteristics of developmental dyslexia in a regular writing system. *Applied Psycholinguistics*, 14, 1-33.

Wimmer, H., Landed, K., & Frith, U. (1999). Learning to read German: Normal and impaired acquisition. In M. Hariss and G. Hatano (Eds.), Learning *to Read and Write: A Cross-Linguistic Perspective* (pp. 34-50). Cambridge University Press.

Wimmer, H., Landed, K., Linortner, R., & Hummer, P. (1991). The relationship of phonemic awareness to reading acquisition: More consequence than precondition but still important. *Cognition*, 40, 219-49.

Witton, C., Richardson, A., Griffiths, T. D., Rees, A., & Green, G. D. R. (1997). Temporal pattern analysis in dyslexia. *British Journal of Audiology*, 31, 100-101.

Wright, C., & Conlon, G. (2009). Auditory and visual processing in children with dyslexia. *Developmental Neuropsychology*, 34, 330-355.

Wolf, M. (1999). What time may tell: Towards a new conceptualization of developmental dyslexia. *Annals of Dyslexia*, 49, 3-28.

Wolf, M., Pfeil, C., Lotz, R., & Biddle, K (1994). Towards a more universal understanding of the developmental dyslexia: the contribution of orthographic factors. In V. W. Berninger (ed). *The varieties of orthographic knowledge*. Dordrecht: Kluwer Academic.

Wolf, M., & O'Brien, B. (2001). On issues of time, fluency and intervention. In A. Fawcett (Ed.), *Dyslexia: Theory and good practise* (pp. 124-140). London: Whurr.

Zabell, C., & Everatt, J. (2002). Surface and phonological subtypes of adult developmental dyslexia, 8(3), 160-177.

Zeigler, J. C., & Goswami, U. (2005). Reading acquisition, developmental dyslexia, and skilled reading across languages: A psycholinguistic grain size theory. *Psychological Bulletin*, 131 (1), 3-29.

Zeigler, J., Pech-Georgel, C., Dufau, S., & Grainger, J. (2010). Rapid processing of letters, digits and symbols: What purely visual-attentional deficit in developmental dyslexia? *Developmental Science*, 13(4), F8-F14.

Appendix A

Dear Participant,

You have been asked to take part in the research project described below. If you have any questions feel free to call **Mrs. Almazam,** the person mainly responsible for this study, **on (050-6322678)**. If you have further questions later please contact Mrs. Almazam via email **(amnaalmazam@hotmail.com)**

Dyslexia is defined as a specific learning disability usually detected when there is a discrepancy of at least 18 months between an individual's reading and chronological age, despite receiving adequate tuition, and with no apparent cause due to emotional difficulties or low intelligence.

Culturally appropriate assessment methods are essential in the effort to accurately diagnose and support dyslexic individuals. Accurate diagnosis and intervention leads to a more effective outcome in remediation, especially reading and writing skills. A lack of culturally appropriate assessment methods, accurate diagnosis and support can often lead dyslexic individuals to suffer losses in self-esteem, confidence, and motivation.

The purpose of this study is to: **a)** Develop a culturally-appropriate dyslexia assessment**. a)** Establish UAE norms for Rapid Naming Test following modifications which will be applied from the results obtained from Name Agreement Test. **c)** Explore reasons for the delay in Rapid Naming test administered in 2008.

If you decide to take part in this study, your participation will involve naming a series of 20 stimuli; each one is repeated twice in one minute. This research will be administered by the researcher.

The results of this study will be kept confidential. That means that your scores and answers to all questions are private. No one other than the researcher can find out what your answers were. Analysis and reports of findings will be based on group data and will not identify your individual responses to the questions.

There is no possible risk, deception, or discomfort associated with this study.

The information obtained from this study might be of a direct benefit to you but it will be useful in developing a culturally appropriate dyslexia assessment tool for Arabic Emirati students.

If you decide now or at any point to withdraw this consent or stop participating, you are free to do so, with no penalty to yourself. You are free to skip specific stimuli and continue participating with no penalty.

I certify that I have read and fully understand the statement of procedure given above and agree to participate in the research project described therein. Permission is given voluntarily and without coercion or undue influence. It is understood that I may discontinue participating at any time without penalty. I will be provided with a copy of this consent form.

THANK YOU FOR YOUR PARTICIPATION

_____

Participant's Name (please Print)

_____ _____

Participant's Signature Date

Dear Participant,

You have been asked to take part in the research project described below. If you have any questions feel free to call **Mrs. Almazam,** the person mainly responsible for this study, **on (050-6322678)**. If you have further questions later please contact Mrs. Almazam via email **(amnaalmazam@hotmail.com)**

Dyslexia is defined as a specific learning disability usually detected when there is a discrepancy of at least 18 months between an individual's reading and chronological age, despite receiving adequate tuition, and with no apparent cause due to emotional difficulties or low intelligence.

Culturally appropriate assessment methods are essential in the effort to accurately diagnose and support dyslexic individuals. Accurate diagnosis and intervention leads to a more effective outcome in remediation, especially reading and writing skills. A lack of culturally appropriate assessment methods, accurate diagnosis and support can often lead dyslexic individuals to suffer losses in self-esteem, confidence, and motivation.

The purpose of this study is to: a) develop a culture appropriate dyslexia assessment test for Arabic speaking individuals and b) develop a support system which will assist dyslexics to reach their potential and ensure their success in academia and the workplace.

If you decide to take part in this study, your participation will involve reading, writing and spelling tasks, diagnostic tasks which will take approximately 30 minutes, and completing a 75-item questionnaire and that will take 15 minutes only. This study will be administered either by the researcher or a qualified tester.

The results of this study will be kept confidential. This means that your scores and answers to all questions are private. No one other than the researcher can find out what your answers were. Analysis and reports of findings will be based on group data and will not identify your individual responses to the questions.

There is no possible risk, deception, or discomfort associated with this study. If you experience any distress as a result of this study please contact the researcher for assistance.

If you decide now or at any point to withdraw this consent or stop participating, you are free to do so, with no penalty to yourself.

I certify that I have read and fully understand the statement of procedure given above and agree to participate in the research project described therein. Permission is given voluntarily and without coercion or undue influence. It is understood that I may discontinue participating at any time without penalty. I will be provided with a copy of this consent form.

THANK YOU FOR YOUR PARTICIPATION

_____

Participant's Name (please Print)

_____ _____

Participant's Signature Date

Appendix B

STUDY 2: STUDENT QUESTIONNAIRE

Participant Code:----------

NO	Items	Strongly disagree	Disagree	Uncertain	Agree	Strongly Agree
1	Counselling services offer support with any issue students might have					
2	Counselling services offer individual and group counselling					
3	Counselling services offer sufficient tine for counselling					
4	There are specific and confidential counselling rooms					
5	Counselling services plan group activities focusing on students' personal growth and development					
6	Counselling services market for their services through newsletters					
7	Counselling services evaluate services through feedback forms					
8	Counselling services offers specific programmes to help students with their varying needs					
9	Counselling services collaborate with the committee to find the best approach to support students					
10	Counselling services provide information about services and activities to all students					
11	Counselling services keep counselling notes					
12	Students can book counselling sessions easily					

13	Counsellors are experienced and help students deal with their issues and difficulties					
14	Counsellors help students make the right decision (academic & personal)					
15	Students can book a session with any counsellor they prefer					
16	Counsellors are committed to help students					
17	Students trust the counsellors					
18	Counsellors plan activities aimed at academic support					
19	Counsellors assist students with academic problems					
20	Counsellors explore causes for students' academic problems					
21	Counsellors assist students understand reasons for their academic problems					
22	Counsellors help students overcome their academic problems					
23	Learning disability support exist					
24	Students have difficulty reading, writing & spelling					
25	Counsellors provide information about LD to all students					
26	There are students with LD in the college					
27	Counselling programmes deal with students ' psychological problems					
28	There are students who have anxiety problems					
29	There are students who are shy					
30	There are students who are oversensitive					

31	There are students who get tired easily					
32	There are students who feel depressed					
33	There are students who feel lonely					
34	There are students who are unable to express their own views and feelings					
35	There are students who have low self-esteem					
36	There are students who hesitate to tell counsellors about their problems					
37	There are students who feel confused					
38	There are students who are inattentive during lectures					
39	There are students who depend on others to solve one's problems					
40	There are students who cannot control or manage anger					
41	There are students who prefer to be alone					
42	There are students who forget easily					
43	There are students who lack self-confidence					
44	There are students who cannot make up their mind					
45	There are students who suffer from mood swings					
46	Counselling programmes address student's social problems					
47	There are students who do not have transportation to and from college					
48	There are students who live far away from home					

49	There are students who have family disputes at home					
50	There is parental interference in a student's personal affairs					
51	There are students whose values conflict with those of their parents					
52	There are students who find difficulty making friends					
53	Counselling services offer individual counselling only					
54	Counselling offers group counselling only					
55	Exam procedures in the college are complicated					
56	College exams are too difficult					
57	There are many exams each semester					
58	Lectures are the main teaching method in the college					
59	There is lack of classroom discussions					
60	Course contents are difficult					
61	There are too many subjects each semester					
62	Students suffer from overloaded syllabus					
63	Curriculum is not relevant to the future career					
64	There are adequate library resources					
65	Library rooms are too small					
66	Equipment in the library is inadequate					
67	There are inadequate resources for scientific research					
68	Teachers frequently miss classes					

69	There is lack of relationship & communication between students & teachers					
70	Students have no choice over courses registered					
71	Students don't have academic problems					
72	There are far too many students in each classroom					
73	Social & extra-curricular activities are very rare					
74	There are no recreational activities					
75	Counsellors do not provide academic support					

Appendix C

STUDY 3: Student Self-assessment

Student Name:---------- ID NO:----------

No	Items	Always	Usually	Sometimes	Never
1	I attend lessons and meetings on time				
2	I use my time effectively				
3	I complete my assignments on time				
4	I complete task in order of priority				
5	I avoid activities which interfere with my planned schedule				
6	I use prime time when I am most alert for study				
7	I force myself to make time for planning				
8	I meet deadlines in advance				
9	I have a favourite study place				
10	I study in a quiet place				
11	I am able to concentrate when studying or working on a task				
12	I can maintain a good level of concentration for at least 20 minutes				
13	I have no problem concentrating when I study				

14	I easily remember what I learn				
15	I practise the material I am learning by reciting out loud				
16	My memory is very good for what I am learning				
17	I rewrite my notes after the lecture				
18	I can concentrate on the discussion while I am taking notes				
19	I write my notes in an organized and meaningful way				
20	I can summarize the main points when I am taking notes				
21	I use a highlighter to identify the important info covered in the lecture				
22	I review my notes after the class				
23	When reading, I mark or underline parts I think are important				
24	I compare my notes with the textbook and highlight important information				
25	I create my own study guide for each exam				
26	I feel confident that I am prepared for the exam				

27	I get enough sleep before an exam				
28	I prepare a mock exam and test myself before the exam				
29	I read and follow instructions carefully during an exam				
30	I double check my work before handing in my exam paper				
31	I ask for clarification if I am confused about the meaning of a question during the exam.				
32	I stay calm during exams				
33	I break down assignments and reading into manageable chunks				
34	I organize my work in a holistic, logical and sequential manner				
35	I draw maps and pictures to help me understand and remember material I study				
36	I relate material learned in one course to material in another				
37	I try to recognize facts in a systematic way				
38	I talk new concepts through with a friend				
39	I understand important points when I am reading				

40	I solve a problem by focusing on its main point				
41	I am able to learn independently				
42	I am interested in the subjects I am studying				
43	I am able to focus for a long period of time				
44	I ask questions in class to better understand the material				
45	I take part in class discussions				
46	I cooperate with my classmates				
47	I listen to others effectively				
48	I like to think from different angles				
49	I skim through a chapter before I begin reading				
50	I allocate a specific time for reading				
51	When reading, I start with summaries first				
52	I pay attention to the theme presented in the reading				
53	I look up vocabulary that I don't understand				
54	I am confident with my reading pace				
55	I am satisfied with my comprehension when reading				

56	I focus on the main point while reading				
57	I keep the purpose and audience in mind when writing				
58	I organise my writing in a logical and meaningful structure				
59	I find it easy to express my thoughts and feelings in writing				
60	I review my writing for grammatical errors				
61	I proofread my writing and correct errors				
62	I am comfortable using library sources for research				
63	I am able to accurately reference sources used in my writing				
64	I am able to search and use library resources and publications				

Appendix D

STUDY 3: Teacher Student-assessment

Student Name:---------- ID NO:----------

Teacher's Name: ---------- Date:----------

No	Items	Always	Usually	Sometimes	Never
1	Attends lessons and meetings on time				
2	Uses her/his time effectively				
3	Completes her/his assignments on time				
4	Meets all assignment deadlines				
5	Keeps up with the planned class activities				
6	Is alert while in class				
7	Has a study and leisure plan for the whole week in advance				
8	Completes tasks prior to the deadline				
9	Able to concentrate in class				
10	Participates in classroom discussion				
11	Stays on task till completion				
12	Asks questions during class and after class				
13	Comes to class prepared				

14	Easily remembers material covered during each class				
15	Takes notes while concentrating in the class				
16	Takes part in group work				
17	Concentrates on class discussion				
18	Focuses on all the tasks and activities during lessons				
19	Avoids distractions and side discussions while in class				
20	Makes appointments to review difficult concepts				
21	Presents accurate and to the point comments				
22	Keeps notes on supplementary reading materials				
23	Organizes her/his thoughts in a meaningful manner				
24	Asks about the material covered in the exam and grading scheme				
25	Creates her/his own study guide for each exam				
26	Reads exam questions carefully before answering				

27	Seems well rested before exams				
28	Volunteers to answer questions during class discussion				
29	Follows instructions carefully during exams				
30	Reviews her/his answers before handing in exam papers				
31	Asks for clarification if confused about the meaning of a question during an exam.				
32	Stays calm during exams				
33	Starts working on assignments ahead of time				
34	Submits work in an organized manner				
35	Uses maps and pictures in assignments and projects				
36	Relates material learned in one course to material in another				
37	Organizes thoughts in a systematic way				
38	Discusses new concepts with friends				
39	Reads confidently				
40	Solves problems by focusing on the main point				

41	Able to learn independently				
42	Shows interest in the subjects area				
43	Able to focus for a long period of time				
44	Asks questions in class to better understand the material				
45	Takes part in group work				
46	Cooperates with her/his classmates				
47	Listens to others effectively				
48	Thinks from different angles				
49	Understands effective reading strategies				
50	Uses effective reading strategies				
51	Shows a good level of reading comprehension				
52	Attends classes regularly				
53	Sits in the front of the class				
54	Has a good reading pace				
55	Avoids activities that interfere with class schedule				

56	Able to focus on the main point while reading				
57	Writing assignments are focused on the purpose and audience				
58	Organizes writing in a logical a meaningful structure				
59	Easily express her/his thoughts and feelings in writing				
60	Writing assignments are free of grammatical and spelling errors				
61	Writing is well structured				
62	Uses library sources for research effectively				
63	Aware of acceptable referencing methods				
64	Able to search and use library resources and publications				